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AUTOMOTIVE INDUSTRIES

VOLUME 58

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NUMBER 26



Many Advantages Seen in Merger of Trade Associations

*Proposed A.E.A. and M. & A.M.A. consolidation will result
in more effective merchandising program and greater
economy in organization work of memberships.*

By Leon F. Banigan

ENHANCED effectiveness and economy in the accomplishment of those things which both manufacturers and wholesalers are striving for, and to which efforts of the Automotive Equipment Association and the Motor and Accessory Manufacturers Association are being directed at present, are expected from the merger which now has been approved in principle by both associations.

The A.E.A. members voted unanimously in favor of the combination last week during their summer convention at Mackinac; the M. & A.M.A. directors had previously approved the proposed set-up. Joint committees from the associations will meet in Chicago, July 17 and 18, to discuss further details of the plan.

Economic forces have been drawing the associations together for a number of years. The project came prominently to the foreground in the summer of 1925, but negotiations ended before they had progressed farther than informal discussions by representatives of the two bodies.

Primarily, the union of the A.E.A. and M.&A.M.A.

is influenced by the opportunities for economies in activities that are fundamentally similar. These possibilities exist not only in the savings through elimination of dual memberships held by more than 70 manufacturing organizations, but also in the credit, market analysis, merchandising, traffic, shows and other major activities of both associations. The M. & A.M.A. membership consists entirely of manufacturers while the A.E.A. embraces both manufacturers and wholesalers. In fact, the combined membership of the two associations actually embraces three distinct types of business: (a) The business handling raw materials and selling engines, bodies, parts, tools, etc., only to car manufacturers; (b) manufacturers of automotive equipment of all kinds who sell through wholesale and retail outlets and who may, or may not, sell to car manufacturers as well; (c) the wholesaler, who is the customer of the class "b" group. And so the merged association would actually be a federation of three types of automotive business in the manufacturing and wholesale fields. The organization to take care of this

federation of memberships will be explained later in this article.

The advantages to the wholesaler are believed to be equally as desirable as those foreseen by the manufacturer. Primarily, the merger appeals from the economy standpoint also, since the marketing and merchandising job to be done can be more adequately funded through a larger and stronger organization, with corresponding reduction in initial cost to the individual member. The federation also brings the wholesalers in more direct touch with the manufacturers of desirable products and the enhanced strength of the combination presents a wider front and a more impressive voice in industrial matters, in trade discussions and in legislative halls.

Further Mergers Predicted

While the men who are handling the details of the present merger are quite content to bend all of their efforts toward the successful launching of this particular project in a way satisfactory to all concerned, there are many in the industry who are inclined to believe—in fact, predict—that if the combination does work out satisfactorily it may prove a forerunner of a wider federation of major groups of the industry which would have an even greater opportunity for service.

The present combination will weld into one association more than 800 of the country's largest and most successful manufacturers and wholesalers. The present membership of the A.E.A. is about 540, divided nearly equally between manufacturers and wholesalers. The M. & A.M.A. membership totals more than 300, all of whom are manufacturers. The firms holding memberships at the present time in both associations number 77.

The proposed plan of federation, which has been approved by both associations, provides for a unique set-up, grouping the membership in three divisions as follows:

(a) Manufacturers selling for original equipment only; producers of raw materials; manufacturers of machinery or tools sold to manufacturers. Members in this class will receive credit service on manufacturers only. They would have the privileges of the national automobile shows and the services of the sales development department. The dues would be less than for manufacturers in division "b" and more than for wholesalers in division "c."

(b) Manufacturers who distribute through wholesale channels only; or manufacturers who distribute through wholesale channels and sell also for original equipment. Members in this division would receive credit services upon both manufacturers and jobbers; they would have the privilege of national shows as well as any trade shows operated by the association. They would receive the greatest benefit from the market development work of the association. This division consequently would be expected to pay more for membership in the new set-up than either of the other divisions, to cover the cost of those services.

(c) Wholesale distributors. Members of this division would receive no credit services, their benefits being merchandising services for their special assistance, general information, special bulletins, conventions and trade shows, the last contemplating an arrangement similar to the A.E.A. plan of reimbursement for expenses of attendance. The members of this division would accordingly pay less than either of the other divisions.

Each division would elect nine counsellors from its

group who would control that division only. The 27 counsellors, nine from each group, would not act jointly. The general administration of the association would be controlled by a board of governors consisting of three counsellors from each division of the membership. And in addition to this controlling board there would be a president, vice-president, secretary, treasurer and assistant treasurer and general committees, as well as a paid managing director, general counsel, branch offices and division managers and the minor personnel of such offices.

Dues would be paid on a sliding scale based on volume of sales. The amounts tentatively set and presented to the A.E.A. membership were as follows:

Division A	
Manufacturers doing \$100,000 to \$500,000 a year.....	\$200
Manufacturers doing \$500,000 to \$1,000,000 a year.....	\$250
Manufacturers doing \$1,000,000 to \$1,500,000 a year.....	\$300
Manufacturers doing \$1,500,000 to \$2,000,000 a year.....	\$350
Manufacturers doing over \$2,000,000 a year.....	\$400
Division B	
Manufacturers doing less than \$500,000 a year.....	\$400
Manufacturers doing \$500,000 to \$1,000,000 a year.....	\$500
Manufacturers doing \$1,000,000 to \$1,500,000 a year.....	\$600
Manufacturers doing \$1,500,000 to \$2,000,000 a year.....	\$700
Manufacturers doing over \$2,000,000 a year.....	\$800
Division C	
Wholesalers doing under \$500,000 a year.....	\$250
Wholesalers doing \$500,000 to \$1,000,000 a year.....	\$300
Wholesalers doing \$1,000,000 to \$1,500,000 a year.....	\$350
Wholesalers doing \$1,500,000 to \$2,000,000 a year.....	\$400
Wholesalers doing over \$2,000,000.....	\$450

Both associations have records of long and satisfactory service to their members. The M.&A.M.A. was organized in 1904 while the A.E.A. came into being as a group of automobile accessory jobbers in 1915. Shortly after its inception, however, the A.E.A. admitted manufacturers, first as associate members and later as full-fledged members of that association.

In the early days of the aftermarket created by expanding automobile ownership, the A.E.A. provided manufacturers and wholesalers a splendid opportunity for unified effort in the development of markets and service to the car owner. A few years after it was organized, it inaugurated the business exhibits held in conjunction with the winter conventions which were open to members of that association and invited wholesalers only. During the past several years the major activities of the association have, of necessity, developed largely along the market development and retail merchandising and educational lines, broadening, 18 months ago, into the Greater Market Development activity which was under the direction of Harry G. Moock until his resignation at the summer convention last week. Details of these developments will be found in the news section of this issue.

Activities Have Been Broad

The M.&A.M.A. has enjoyed the confidence and cooperation of the car manufacturers, has been active in many of the larger movements in the industry, and has built up strong departments serving its members along market research and educational, credit, traffic, foreign trade, and exposition lines. In the latter activity, it has cooperated with the National Automobile Chamber of Commerce in conducting the national automobile shows of New York and Chicago and with the management of the Boston show, the large regional show for New England.

The M.&A.M.A. has always maintained cordial relations with the wholesale and retail divisions of the industry as well as the manufacturing elements. Like

(Continued on page 1009)

Problem of Bus-Truck Regulation Can *be* Solved, Says Brosseau

Tells Motor Transport Division of A.R.A. that manufacturers would welcome opportunity to confer with all interested parties in effort to reach agreement on question.

By Donald Blanchard

REGULATION of interstate motor vehicle common carriers, the effect of highway transportation on rail revenues and rail-car design were the major topics around which discussion centered at the joint meeting of representatives of automotive interests and the Motor Transport Division of the American Railway Association. This joint meeting concluded the three-day convention held by the Division in Atlantic City, June 23-25.

The subject of interstate regulation was introduced by A. P. Russell, vice-president of the New Haven Railroad and chairman of the Motor Transport Division. He said that the present basis of competition was not fair to the regulated carriers and invited the cooperation of the automotive industry in finding a solution to this problem.

Manufacturers' Attitude

In stating the position of the vehicle makers, A. J. Brosseau, vice-president of the National Automobile Chamber of Commerce and president of Mack Trucks, Inc., reiterated that the manufacturers are not opposed to regulation of buses in principle, citing various statements of the manufacturers to support this contention. He pointed out, however, that the manufacturers had found it necessary to oppose certain attempts to translate this principle into legislation because the regulation proposed would have been unnecessarily restrictive of the growth of motor transportation. In regard to trucks, the manufacturers see no present need for regulation in this field and Mr. Brosseau referred to the fact that this was also the viewpoint of the Interstate Commerce Commission as expressed in the recent report of the Commission on its investigation of the subject.

If all parties at interest want to find a solution of the problem—all or in part—Mr. Brosseau is of the opinion that a meeting of the minds can be brought out. He indicated further that the manufacturers would welcome an opportunity to confer with all interested parties in an effort to secure an answer to the regulatory question. In his opinion, much of the difficulty that has been experienced is due to the fact that the matter has not been in the hands of practical operating men.

B. F. Fitch, president of Motor Terminals, Inc., stated that what was needed was not more regulation but less, and that the railroads should be empowered to engage in highway transportation on the same basis as any other agency.

A statement made elsewhere by Frank McManamy, member of the I. C. C., to the effect that the business taken from the rails by the motor carriers was

generally of an unprofitable type for the railroads to handle and hence its loss was not an unmixed evil, precipitated some discussion on the effect of highway competition on rail revenues. Chairman Russell said that he was going to undertake to provide facts to show that the commissioner was not entirely correct and referred to the fact that over a recent week-end the New Haven's bus subsidiary carried 1000 passengers in 44 buses between New York and Boston. Other similar instances of the volume of bus traffic were cited to show that the loss was important. Frank Fagoel of the Twin-Coach Corp. made the prediction that the advent of buses of larger seating capacity had made it economical to haul passengers for two cents a mile for distances up to 200 or 300 miles.

The rail-car discussion centered around the question of capacity. It was made clear that the tendency is toward larger units and that the rail men do not see any future for a light-weight unit of seating capacity comparable to that of a bus. In order to take care of extreme variations in traffic, the railroads said they need motor cars capable of pulling four or five trailers. The possibilities of multiple-unit operation were discussed as were the advantages of a rail-car with two separate powerplants, one to be used for normal operation and perhaps when starting with both available when it was desired to operate the trailers. The additional investment required for the additional powerplant was stated not to be of any significance. In connection with light-weight rail-cars having seating capacity approximating that of the bus, it was brought out that a rail-car is a train and must have an engineer and a conductor. Consequently, with a car of small capacity the overhead expense was high. Roy Hauer of the Mack company pointed out, that where good highways were available, the bus provided more economical transportation in cases where the traffic was small enough for a light-weight rail-car to handle it.

Standard Coupling Needed

Standardization of coupling devices for tractor-trailer combinations was urged by G. C. Woodruff of the New York Central Railroad.

The Division held closed sessions on the first two days of its convention and these were occupied largely by reports of committees which had been studying various phases of highway transportation, including regulation, the desirability of bus operation by a railroad, liability insurance and the policy of state regulatory bodies.

The next meeting of the Division will be held in Detroit, Oct. 24-25.

Truck Mergers Result in Stronger Dealer Organizations

This apparently has been prime consideration in recent move toward combinations in the commercial vehicle field. Further amalgamations reported under way.

By Norman G. Shidle

MERGERS have been coming thick and fast in the truck field as well as in the parts and car branches of the automotive industry. While unquestionably a part of the general trend toward consolidation which current overproduction capacity has fostered in almost every industry, certain individualized factors appear from an examination of the truck merger situation.

Distribution necessities rather than desire for greater manufacturing economies alone would seem to be prime considerations in the pressure toward combinations in the truck field.

Reduction in operating overhead, consolidation of production facilities and certain purchasing advantages unquestionably have been and will be potential influences in determining mergers of commercial vehicle builders. But to an even greater extent than in the passenger car field, these important considerations would seem to be outweighed by the possibilities for increasing, not only the number, but also the caliber of individual dealer and distributor organizations.

Greater Stability Sought

Mergers in the truck field, moreover, have for the most part been those of companies banding together to obtain a greater stability through consolidation of lines, organizations and interests, rather than in any sense to attempt major domination of large parts of the total market. Passenger car mergers, in other words, have frequently involved companies already having an individual position of considerable dominance. Mergers in the purely truck field thus far have been confined chiefly to organizations which at the time or combination were small or medium sized.

There is not then in the truck business the natural grouping of multi-company interests as opposed to independent interests which has come about in the passenger car field. None of the multi-truck company organizations are as large in respect to total assets as are several of the important independent truck concerns nor as are the truck interests of several important passenger car manufacturers.

In the working out of activities following various truck mergers—and following passenger car company and parts company mergers as well for that matter—it becomes more and more apparent that the purely cost reducing features of the merger lie in the office and factory overhead items. Sales costs rarely can be reduced unless the merger brings about a monopoly, which is rare in automotive work. Through the merger, however, marketing effort frequently can be and often is increased in efficiency by a very consid-

erable extent. Increased efficiency and cost reduction are not always synonymous terms by any means.

One of the first results of some of the truck mergers, for example, has been to eliminate the weakest retailers from the dealer organizations of all of the companies privy to the merger. The number remaining in the combined dealer organization for a time, in some instances, is little if any larger than that of the largest of the company dealer organizations before the merger. The value and grade of the new organization, on the other hand, is considerably higher and forms a sound basis for going forward with the building of more dealers and more retail outlets in territories yet inadequately covered.

It is impossible to discuss the truck merger situation, as a matter of fact, without laying very strong emphasis on the fight for more and better dealers which is taking place in the truck field today. More than ever before manufacturers, whether distributing on a national or on a reasonably wide territorial basis, are striving to get and hold soundly financed, virile retailers who will merchandise as well as merely handle their vehicles. The cost of selling through the merged organization probably can be no less than previous to the merger because the same problems of competition, merchandising effort and distribution are present as before the merger. But the possibility of making a profit is increased because of the decreased factory capacity and costs which finally accrue from combinations, eventually if not immediately.

No Cause for Uneasiness

In the truck, as in other branches of the automotive field, combinations and mergers today are to be expected and carry with them no cause for uneasiness either among manufacturers not involved in mergers or among the field organizations. Study of the situation gives indications of greater stability resulting for the truck business in general as a result of most consolidations. This is encouraging because there can be no doubt that an era of mergers has arrived in the truck business. Following the organization of Yellow Truck & Coach Manufacturing Co. with a controlling interest, by General Motors Corp., in 1925, there has been, particularly since the beginning of 1927, a succession of mergers and combinations throughout the truck industry, with rumors of further combinations now playing about even some of the most important names in the industry.

Relay Motors Corp., of course, was one of the first of the 1927 combinations to gain wide attention in

the industry. Including originally an amalgamation of Commerce Motor Truck Co. and Service Motors, Inc., this new organization later brought under its wing the Garford Motor Truck Co. This combination, under the name of Relay Motors Corp., showed total assets of \$5,111,186 on Dec. 31, 1927.

Shortly after the first of the year in 1927, there was completed a merger of Hahn Motor Truck Co., Bethlehem Motors Corp., and Lehigh Co. The Lehigh Co. had been formed as a subsidiary of the Bethlehem Motors Corp. to act as sales agent for a special job known as the Lehigh truck. The Hahn Motor Truck Corp., although dating only from 1920 under its present name, has a continuous history dating back to the beginning of the century. It was formed in 1920 as a successor to the Hahn Motor Truck and Wagon Co. which in turn had succeeded Wm. G. Hahn & Bros., a company which had been established in 1903. W. G. Hahn, founder of the company, still is active as chairman of the board of directors of the merged organization.

Republic Expansion

The purchase by Republic Motor Truck Co. of the Linn Mfg. Co. in August of last year resulted in an organization showing total assets of \$5,019,471 at the beginning of 1928. The Linn company makes a tractor truck for use in soft ground and thus constituted a clear addition to the line already built by Republic.

Early in 1928 came the formation of the Brockway Motortruck Corp. from the combination of the Brockway Motortruck Corp. and the Indiana Truck Co. with combined assets well in excess of \$9,000,000. Then came the merger of the Corbitt Truck Co. with the Sterling Motor Truck Co., combined with assets totaling over \$4,000,000.

In addition to the many vague rumors about possible future mergers of purely truck interests, there are one or two combinations that appear to be definitely under way.

Two prominent truck lines—Graham Bros. and Pierce-Arrow—are associated with passenger car companies involved in current merger deals or negotiations. By his acquisition of Dodge Bros., Inc., Walter P. Chrysler gains control of one of the outstanding truck lines of the industry. Since no truck unit was included in the former Chrysler holdings, however, the Graham units, for several years now a part of Dodge Bros. Inc., are expected to continue just as in the past. The same situation might be true of the commercial vehicles in the Pierce-Arrow line, should the pending merger negotiations with other companies come to fruition.

Mergers of the Past

It is worth remembering that the presence of truck companies in mergers has occurred on various occasions in the past; truck company consolidations are not a new phenomena despite their great current prominence. Mack Trucks, Inc., as a matter of fact, with total assets now of more than \$50,000,000 and one of the leading producers in the truck field, is the outcome of consolidation of several companies some years ago. On Oct. 18, 1911, the International Motor Co. was incorporated in Delaware and acquired all of the capital stock of Mack Bros. Motor Car Co., the International-Plainfield Motor Co. and the Hewitt Motor Co. In 1916 the International Motor Truck Corp. was incorporated as a reorganization of the International Motor Co., and in 1922 the corpor-

ate name was changed to Mack Trucks, Inc. On Dec. 17, 1919, the International Motor Truck Corp. had merged with the Wright-Martin Aircraft Corp.

It is interesting to note, too, that the present Willys-Overland Knight-motored truck line, announced last year, is not John N. Willys' first enterprise in the commercial vehicle field. The Willys-Overland Co. at one time owned the Garford Co., which then was manufacturing a passenger car, in addition to a ton truck line, and also the Gramm Motor Truck Co. The Willys-Overland interest in these two organizations was disposed of in 1915.

Then the presence of the Kelly-Springfield Motor Truck Co. in the Hares Motors venture of 1920 is but one more of the numerous occasions in the past when truck companies have figured in combinations of one kind or another.

Mergers of the type which have been taking place in the truck industry would seem quite definitely to be in the direction of greater stability for the retailers and distributors as well as for the manufacturing organizations participating in them.

Fiat-Engined Airplane Sets New Endurance Record

BY remaining in the air 58 hr. 34 min., covering a total distance of 4763 miles and maintaining an average speed of 86.8 m.p.h. for a distance of 5000 kilometers, the Italian aviators Ferrarin and Del Porte have established three world's records. The greater distance flown three days later by two Belgian pilots* doubtless will not affect the Italian record, for the Belgians had their fuel supply renewed while in the air.

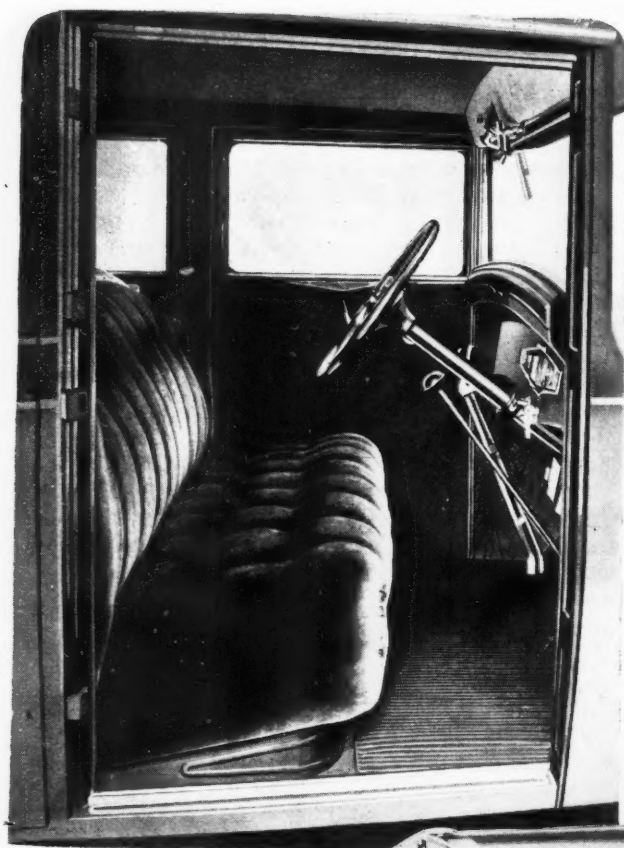
The Italian machine used for the record-breaking performance was the S-64 built by the Savoia Co. to the designs of Engineer Marchetti. A thick wing monoplane with a spread of 67 ft., a length of 57 ft. and a height of 15½ ft., its area is 646 sq. ft. and its weight empty 5940 lb. The machine took the air with a weight of 14,300 lb. of which 7700 lb. represented gasoline.

A 12-cylinder Fiat A-22 engine, developing 550 h.p., was used. The engine ran on very highly refined straight gas. This engine had undergone a 104-hour bench test of which 52 were under full load.

The construction of the machine is entirely of wood, with the exception of the engine cradle and the landing gear, which are of steel and duraluminum. The wings are formed of air tight cases, to allow the machine to remain afloat in case of accident over water. One of the features of the machine is the completely inclosed pilot's cabin, which has double control, a small bed, and a wireless installation. The pilots were remarkably fresh after more than 58 hours in the air and before landing both of them shaved.

The Savoia machine and engine were bought by the Government before the record flight and very liberal Government assistance was given in establishing the record. A concrete runway 33 yards wide and 1400 yards long was constructed specially. The starting platform had a height of 32 ft. and joined the horizontal runway by a 7 per cent grade. Six electric searchlights and two acetylene searchlights were provided, together with the necessary staff for operating them.

* The Belgian record was made on June 4 by Serg. Victor Groenen and Adj. Louis Crooj, of the Belgian army. They remained aloft 60 hr. 8 min. Groenen was killed 10 days later in a crash at Gossencourt Airdrome.



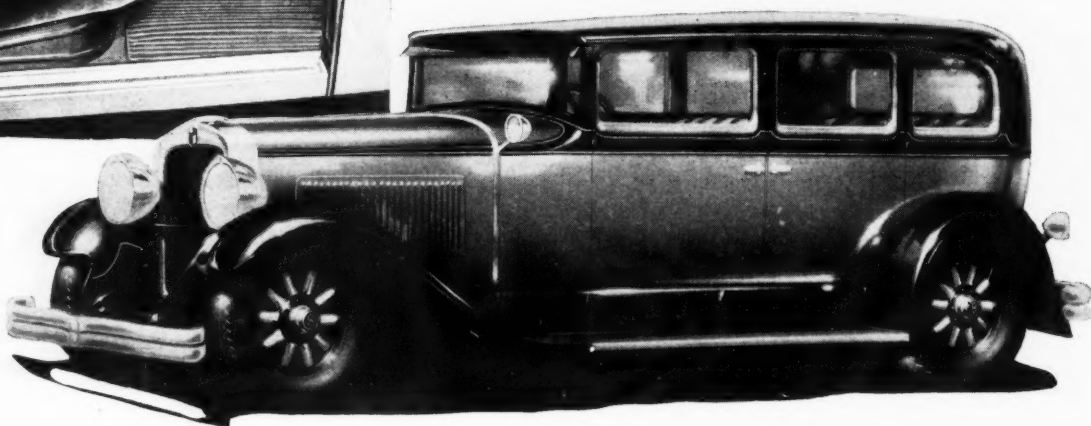
Front compartment of new Nash, showing extra leg room obtained by mounting gear-shift lever on clutch housing cover plate

Nash Engine in Higher

Two point ignition and Bohnalite ratio raised. Bijur chassis Advanced Six. Exposed me

and a six-lobed cam and two breaker arms cause both plugs in the same cylinder to spark simultaneously. The system also comprises two coils, and either set of spark plugs can be cut out at the will of the operator. Aircraft-type metric-size spark

New Nash Advanced Six seven-passenger sedan. Note harmonious design of radiator shell, headlights, front fenders and bumper



By M. Warren Baker

THE new "400" series recently announced by the Nash Motors Co. of Kenosha, Wis., and described briefly in *Automotive Industries* of June 23, embodies three lines of the same denomination as those which constituted the 300 series—the Standard Six, the Special Six and the Advanced Six. Without changing the cylinder dimensions, the top speeds of the three models have been increased to 70, 75 and 85 m.p.h. respectively, by increasing the compression ratios and the peaking speeds, this being made possible by the adoption of invar-strutted Bohnalite pistons and of two-point ignition in the case of the two larger models.

In some of the models the wheelbase has been increased, and the bodies are generally more roomy and more attractive. The equipment that comes with the cars has been added to, but prices have been kept at about the same level as previously. The compression ratio, which in the 300 series varied between 4.5 and 4.69 in the different models, is now 5.

Twin ignition is an outstanding feature of the Advanced Six and Special Six engines. One plug is located in the cylinder head and the other in the cylinder wall at the side of the compression chamber,

plugs are used, 12 being required for each engine.

As previously, the valve-in-head type of construction is employed in the Advanced Six and the Special Six, while the Standard Six has L-head construction. Certain other engine specifications have been changed, however, one of these changes being an increase in the pressure of the engine lubricating system.

Roomier Rear Seats

The frame has been redesigned to allow of roomier rear seats, and a new engine cradle has been provided, the engine now having a four-point support on rubber pads. The front cradle is a heavy steel stamping inverted channel section while the rear cradle is formed by a tubular cross-member welded into sleeves which are riveted to the frame on both sides. Both cradle members have a pronounced drop.

The frame flares out just behind the center gusseted cross-member, so that the rear compartment of the bodies can be made wider. With the new arrangement the sides of the body are directly over the centers of the rear wheels, which gives a rear seat with ample room for three persons, and this with standard tread and without body overhang.

In both the Special Six and the Advanced Six, six frame cross-members are provided, four of them be-

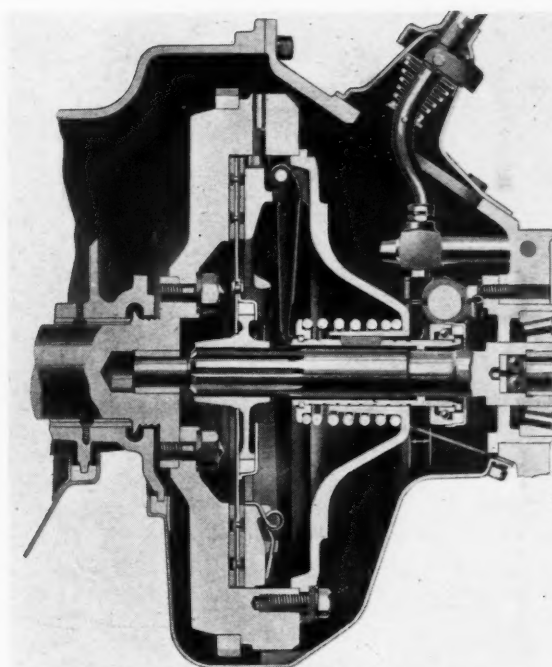
Changes Result Speed

pistons adopted. Compression lubrication system used on tal parts chromium plated.

ing tubular and the other two of pressed steel. The frame itself is of the double-drop type. Rubber insulation is used between the frame and body at all points. By narrowing the frame in front the minimum turning radii have been reduced 20 per cent. On the 130-in. wheelbase models this radius is now 22 ft.

Advanced Six engines have a piston displacement of 278.4 cu. in. and develop 78 b.hp. at 2900 r.p.m. The maximum torque is 184 lb.-ft. at 1000 r.p.m. Piston pins in the new series are of hollow construction and are full-floating. They are prevented from drifting by snap rings in the piston bearings. These bearings are lubricated through oil holes drilled in the piston itself, while the connecting rod upper bearing is lubricated through holes drilled in the top of the bearing. Connecting rods have a 10-in. center-to-center length, and the piston and connecting rod assembly weighs 36 oz.

Tungsten steel is used for the inlet valves and silchrome for the exhausts. Valves have a clear diameter of $1\frac{19}{32}$ in. and a lift of 0.348 in. Connecting rod bearings are of the bronze-backed, bab-

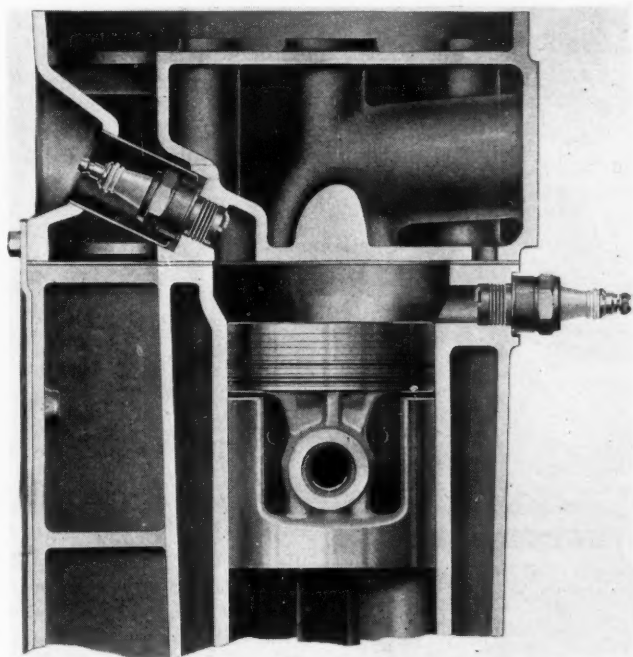


New mounting of gearshift lever on clutch housing cover plate

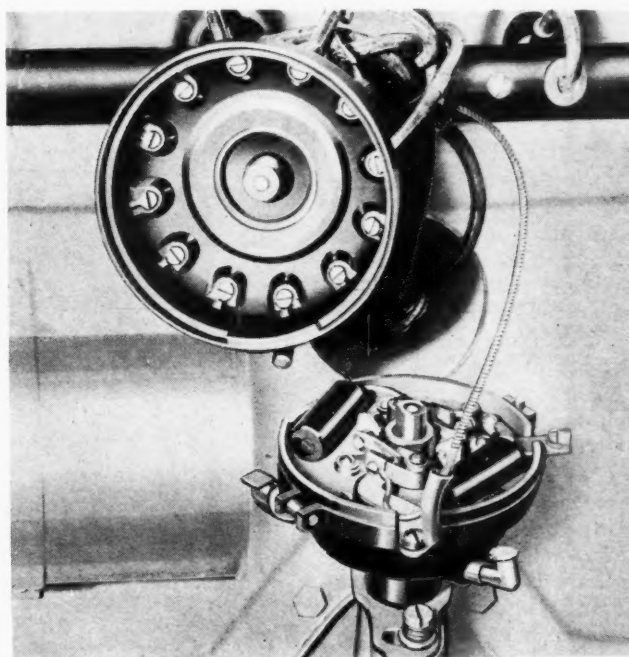
bitt-lined type, $2\frac{1}{4}$ in. in diameter and $1\frac{1}{2}$ in. long.

The camshaft is mounted in four bearings, so graduated in size that the shaft may be removed from the front of the engine. Diameters and lengths are (front to rear): $1\frac{1}{2} \times 2\frac{1}{8}$ in., 2.171×1 in., 2.108×1 in., and $1\frac{1}{8} \times 2$ in. (The front bearing evidently comes out with the shaft—Editor.) The timing gear pinion is of steel while the cam gear is Celoron.

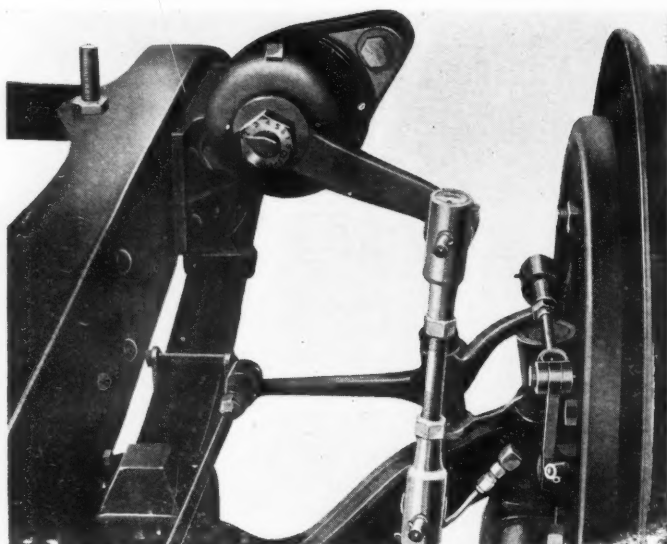
An Auto-Lite electric system is used on the Advanced and Special Sixes, the generator being mounted on the front of the block and driven by the fan shaft. The fan is fitted with an automatic clutch



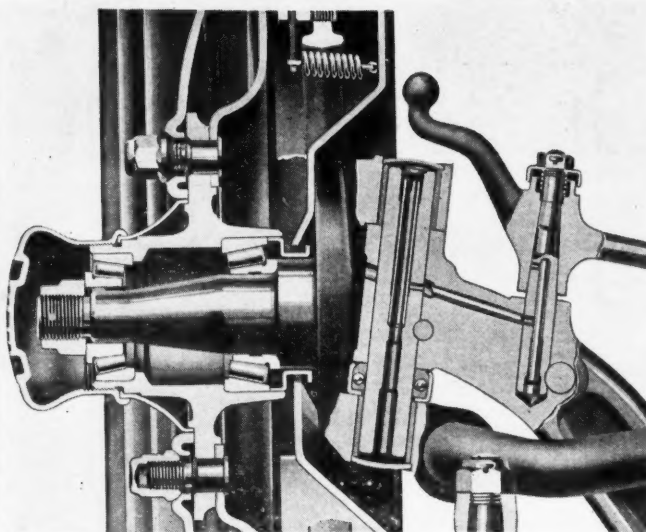
Section through cylinder and head, showing location of spark plugs



Twin ignition unit as used on new Nashes, with cover removed



Houdaille shock absorbers mounted with arms extending transversely of the car, to prevent wheel wobble



Front axle end, knuckle and wheel center in sectioned view showing application of Bijur chassis lubrication and Nash taper roller bearings

which disengages it when the car speed reaches 35 m.p.h. Starter engagement is manual. The distributor is driven from the upper end of the oil pump driveshaft.

Thermostatic control is a feature of the cooling system, which has a capacity of 19 quarts. Water is circulated through the fin-and-tube radiator by a centrifugal pump mounted just ahead of the gear-case cover and driven directly by the camshaft.

The cylinder block and upper half of the crankcase are cast of semi-steel, while the lower half of crankcase is of pressed steel. A float type oil level gage is provided and the oil capacity is 8 qt. The high pressure oil pump is located near the center of the lower crankcase half.

A Marvel $1\frac{1}{2}$ in. carburetor of special Nash design is standard equipment. It includes an exhaust gas jacket with heat control interconnected with the throttle and operated from the dash. Seasonal heat and starting carburetor controls also are mounted on the dash. Fuel feed is by Stewart vacuum tank.

The transmission has been redesigned to give higher speed (45 m.p.h.) in second gear. The gear shift lever now is mounted on the clutch housing cover plate and its lower end is curved into a perpendicular position to engage the shifter bars, which extend forward into the clutch housing. This mounting adds to the leg room in the driving compartment and allows the driver to enter and leave the car from either side without discomfort.

Nash taper roller bearings are used throughout the transmission, while the end of the clutch shaft is carried in a self-lubricating bearing piloted in the crankshaft. The countershaft cluster has bronze bearings and revolves on a stationary shaft. The reduction in second gear is 1.72 to 1; in low, 3.16

to 1, and in reverse, 4.22 to 1. A Borg & Beck clutch is used. Bijur lubrication is one of the chassis features of the Advanced Six line.

Nash taper rollers are used in the front wheels and the entire axle assembly is lubricated by the Bijur system. Spring shimmy dampers are used on each end of the tie rod. The rear axle is of Nash make and is semi-floating; it has a malleable differential carrier and steel axle tubes. The ratio is $4\frac{1}{2}$ to 1.

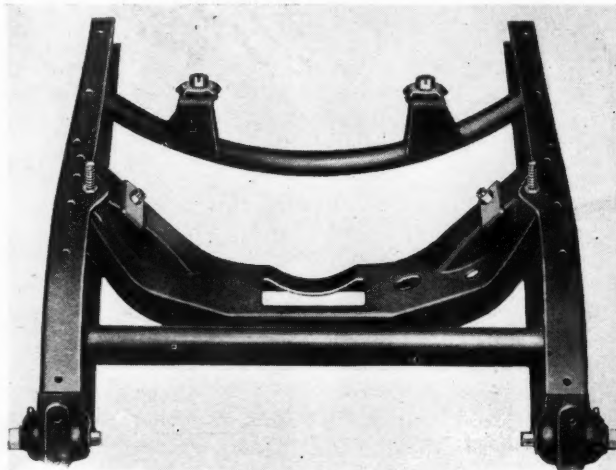
Mechanical front and rear brakes are of Nash design, with expanding shoes on the front wheels and contracting bands on the rear. Both sets are of 16 in. diameter, while the widths are 2 in. for the front and $2\frac{1}{2}$ in. for the rear. Brake drums are of pressed steel, the rear brake shoes of hard rolled steel, and the front shoes of die-cast aluminum. Front brakes provide 126 sq. in. braking surface; rear brakes 222 sq. in.

The parking brake is mounted behind the transmission; it has a diameter of $6\frac{1}{2}$ in. and a width of $2\frac{1}{2}$ in., giving a braking surface of 34 sq. in. The parking brake is linked to the hand lever by cable.

Front and rear springs are of the semi-elliptic type and made of alloy steel. Rear springs are $56\frac{1}{2}$ in. long and $2\frac{1}{4}$ in. wide, while front springs are $39\frac{1}{2}$ in. long and 2 in. wide. Extruded bronze bushings are used for the spring eyes and Bijur fittings furnish the lubrication.

A Nash all-metal, fully inclosed universal joint is used at the front of the propeller shaft, while a flexible disk unit is standard equipment at the rear. A tubular welded propeller shaft is used.

A Gemmer worm and roller steering gear is used on the Advanced Six, while the Special is being equipped at the present time with both Gemmer and Ross cam and lever gears in various models. The



New engine cradle which provides four-point suspension

steering wheel is 18 in. in diameter and of the thin grip style. Spark and throttle levers and a light switch are mounted on the steering wheel. Spark advance in the Special and Advanced Six lines is semi-automatic, while in the Standard line it is fully automatic.

Wood and disk wheels are optional. Tires are 32 x 6.00 in. all around. Two wheelbases are provided in this line, 130 in. for five models and 121 in. for two.

The Special Six engine has a piston displacement of 224 cu. in. and develops 65 b.h.p. at 2850 r.p.m. Connecting rods are 9 in. long, and the piston and connecting rod assembly weighs 26 oz. Inlet valves are of chrome nickel steel and exhausts are of silchrome. They have a clear opening of $1\frac{3}{8}$ in. and a lift of 0.353 in. Connecting rod bearings are $2\frac{1}{8}$ in. in diameter and $1\frac{3}{8}$ in. long. The camshaft, as in the Advanced Six line, is withdrawable from the front and has the following bearing diameters and lengths (front to rear): $1\frac{1}{2}$ x $1\frac{13}{16}$ in., 2.171 x $15/16$ in., 2.108 x $15/16$ in. and $1\frac{1}{8}$ x $2\frac{1}{16}$ in.

Brakes are slightly smaller than on the Advanced Six, the parking brake being $6\frac{1}{2}$ in. by $2\frac{1}{2}$ in., while the front wheel brakes are $13\frac{5}{8}$ in. in diameter and the rear wheel brakes, $13\frac{1}{2}$ in., both being 2 in. wide. Front springs are 38 in. long, rear springs, 54 in., and both sets are 2 in. wider. Chassis lubrication on the Special and Standard Six lines is by Alemite fittings. The wheelbase of the Special Six is 116 in.; the tires on this model are 29 x 5.50.

The new Seaman bodies with which the entire "400" series is equipped, are of the "Salon" type and embody riding comfort with luxurious appearance.

Seats and back cushions are of the form-fitting saddle-back type and lighter gage spring coils are used to improve the cushioning. Windshields are of the swing type, operated by a lever at the top on the driver's side. The windshield wiper is built in and the entire operating mechanism is concealed.

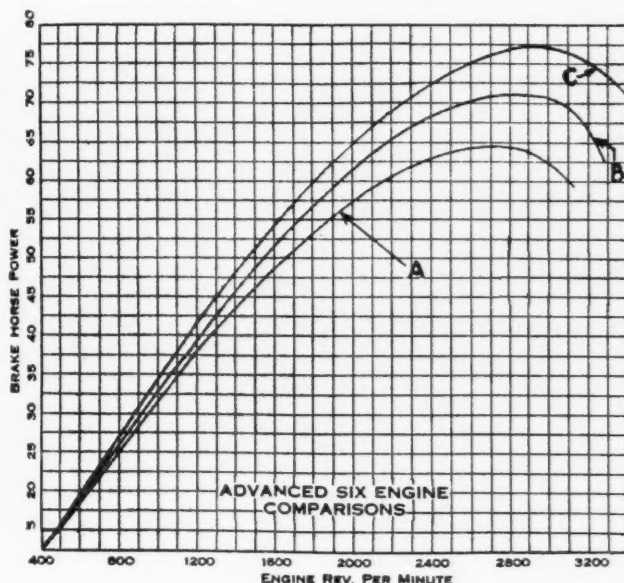
Cowl ventilation is provided by crown panels instead of the usual ventilator on top of the cowl. Front body pillars are of the clear-vision type, and mechanical stops are placed on top of the doors, eliminating strap breakage, besides checking the outward swing of the door at all points.

Door lock levers are of the remote control type and higher-priced hardware is used on most of the lower priced models. The hardware design, however, is different for each of the three groups.

A feature of certain of the Advanced Six models is a folding center arm rest which may be moved out of the way when the rear seat is occupied by three.

No applied belt molding is used in any of the three lines, thus eliminating cracking of paint along the edges.

A newly designed name plate, combined with the new crested radiator cap and the polish of the chro-



Horsepower comparisons of Advanced Six engine:
A—Single ignition, cast-iron pistons, 4.30 compression ratio; B—Twin ignition, aluminum pistons, 4.75 compression ratio; C—Twin ignition, aluminum pistons, 5.15 compression ratio

mium plated radiator shell, gives the front of the car a new and attractive appearance.

Standard equipment on all models includes front and rear bumpers, chromium-plated headlights and radiator shell, windshield wiper, electric clock, dash gasoline gage, dash heat indicator, speedometer, ammeter, oil gage, coincidental lock, sun visor, scuff plates, tire cover, rear traffic signal, vanity sets on the larger closed models, arm rests in most models, built-in trunks on Models 433, 463 and 467, Houdaille out-board mounted shock absorbers on the Advanced Six and Lovejoy on the Special and Standard Six lines.

Specifications of the new Standard Six chassis have been changed to a large

extent. Although the engine retains the L-head construction, the adoption of Bohnalite pistons has permitted of raising the compression and the engine now develops 52 b.h.p. at 2950 r.p.m. The camshaft is now carried in six bearings, so graduated as to allow easy withdrawal.

A Carter $1\frac{1}{8}$ in. carburetor of the multiple jet type, with adjustment for high and low speeds, is used, and a hot spot has been engineered into the manifold.

Front and rear axles follow closely the design of the Advanced and Special Sixes, using Nash taper roller bearings both front and rear. Alemite fittings furnish the lubrication throughout the chassis. Universal joints, both front and rear, are flexible disks.

The parking brake on the Standard Six is an internal brake on the rear wheels, while the service brakes are internal on the front wheels and external on the rear.

Semi-elliptic front and rear springs are 36 in. and $50\frac{7}{8}$ in. long respectively. Ross cam and lever steering mechanism is provided and the wheel is of the small section type, 17 in. in diameter.

The electrical system is a two-unit Auto-Lite, using Bendix starter engagement.

The wheelbase of the Standard Six is $112\frac{1}{4}$ in. and, although this represents an increase of 4 in. over the "300" Standard, the turning radius has been reduced to 19 ft. by narrowing the frame in front.

UNDER a commercial treaty recently entered into between France and Austria, the former country gains important concessions for its automobile industry. Austria at present has an embargo on automobile imports, but heretofore France was allowed to import 300 cars per year by special concession. This number is now increased to 500. Austrian automobile manufacturers have been demanding an increase in the rates of duty on cars imported under special concessions and a change in the present combined duty into a pure weight-basis duty, but this subject will be considered only if the embargo on automobiles should be raised.

Atomization Takes Place in Tank in New Fuel System

Conventional type carburetor eliminated by latest Stewart-Warner development which insures thorough vaporization of fuel before it reaches engine by direct line.

By A. F. Denham

FOR a number of years there has been under development by the Stewart-Warner Speedometer Corp. an entirely new system of fuel supply, the possibilities of which can be classed as revolutionary for the entire internal combustion field. It has now reached the announcement stage. The layout of this system calls for the elimination of the normal type carburetor, and both vacuum tank and fuel pump, with the substitution of a simple system which is designed to supply a dry mixture of gasoline and air in the correct proportions to the intake manifold without intermediate storage of fuel between the gasoline tank at the rear of the chassis and the manifold.

The fuel system of the automotive vehicle in its evolution probably has undergone fewer fundamental changes than any other comparably important part. Except where gravity or pressure feeds were applied, vacuum-tank feed was practically in universal use until the recent introduction of mechanically-operated fuel pumps of the diaphragm type, the latter development being due primarily to the low manifold vacuums in a number of automobile engines. Carburetors also have been vastly improved since their introduction, but in principle there has been but little change.

Although it is only one of eight new systems offered by this company, the others being developments based on present practice, the new direct fuel system, if adopted, would, therefore, be the first radical change in supplying a combustible mixture to the engine.

In discussing the direct fuel feed system it must be kept in mind that fundamentally the internal com-

bustion engine is nothing more or less than a hot air engine whose cycle of operation calls for rapid heating of the air. In the second place, rapid heating of the gas is possible only with thoroughly vaporized as distinguished from atomized fuel, as only with fully vaporized fuel is it possible to obtain an explosion-like, complete combustion.

In the early days of the internal combustion engine, speeds were relatively low and fuels had low boiling points, which made vaporization a comparatively easy problem to which the carburetor in its elementary stage furnished the solution. As engine speeds increased and fuel quality became lower and lower, fuel vaporization became an increasingly serious problem. In most cases it was found that to satisfy requirements it was not only necessary to improve vastly the atomizing action of the carburetor but also to provide for the flow of heat from the exhaust to the intake manifold to convert the atomized fuel into a dry vapor. Improvements in manifolding and hotspot designs have aided materially, but even though the modern system in most cases is effective, it still remains a compromise.

Cooling of Gases a Problem

With normal design for thorough vaporization at modern engine speeds the heat transfer must be quite large. But heat supply to the charge causes the volumetric efficiency of the engine to drop, and the power output to decrease. It has not yet been found possible to cool gases again after vaporization in the usual automotive engine, chiefly due to the fact that, in spite of everything, there still is incomplete vapor-

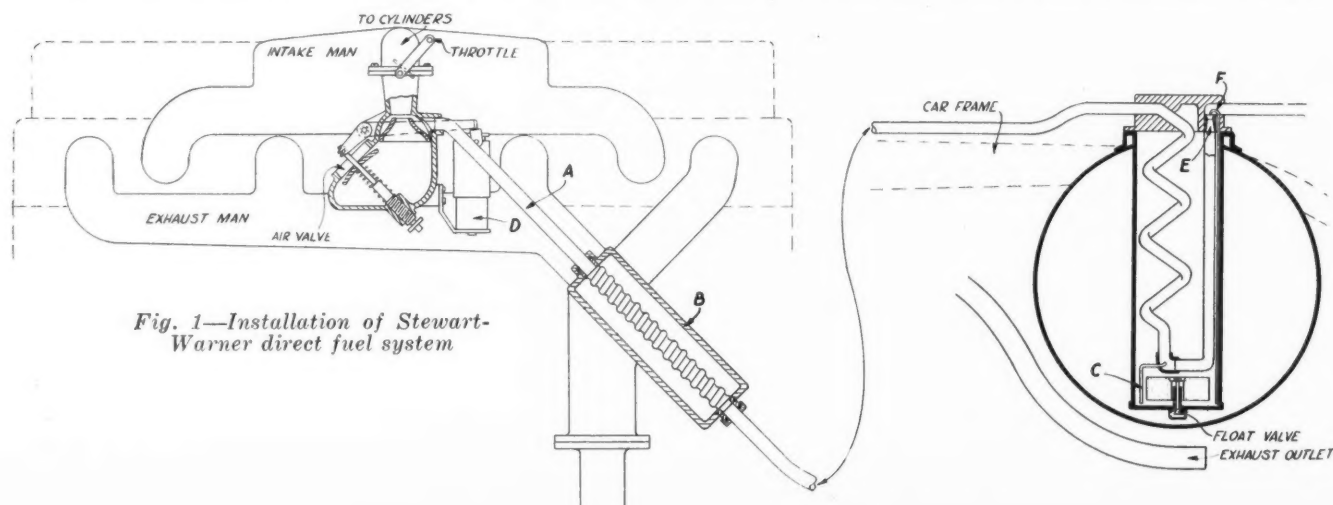


Fig. 1—Installation of Stewart-Warner direct fuel system

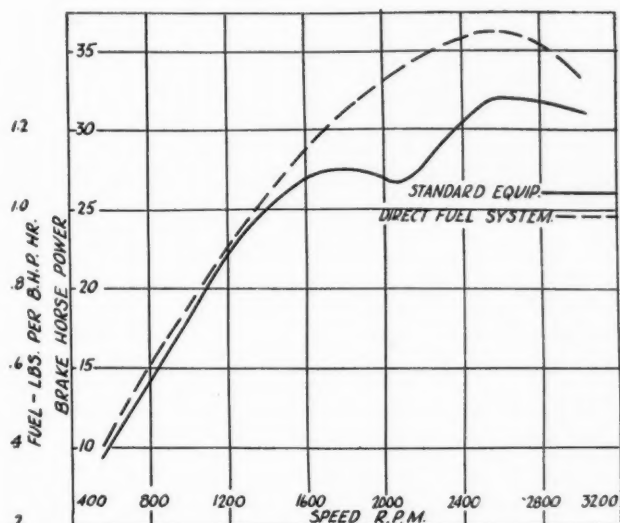


Fig. 2—Open throttle horsepower curves for four-cylinder engine with stock equipment and Stewart-Warner direct fuel system respectively

ization, and if the mixture were cooled the atomized fuel would have a tendency to condense out again, which would in many cases result in poor distribution, incomplete combustion and excessive crankcase dilution. The mere following of the convention of placing the atomizing carburetor right at the intake manifold inlet has been a serious handicap, since it limits the allowable space in which complete vaporization can be obtained.

The various desiderata for fuel feed systems may be summarized as follows:

1. Thorough vaporization as opposed to atomization, either through sufficient area of exposure of liquid fuel to air at low pressure, or through sufficient heat provision to accomplish this with average low grade fuels, or both.
2. Provision for maintaining correct mixture ratios for varying load and speed conditions, including provision for low idling speeds.
3. Provision for automatic variations of mixture ratio for accelerating at various speeds, including an accelerating supply well.
4. Provision for quick starting at low temperatures.
5. Cooling of dry gas mixture before admission to cylinders if vaporized by heat, to obtain good volumetric efficiency.
6. Safety against fire (the last being extremely important in the case of aircraft powerplants).
7. Simplification through the elimination of intermediate handling stages if possible, to reduce possibilities of service troubles and keep down cost.

The fundamental principle of the direct-feed fuel system is to atomize and vaporize the fuel thoroughly before finally mixing it with a sufficient quantity of air to form a combustible mixture, this giving a dry, cool gas. To do this the carbureting action is transferred to the main fuel tank. A semi-vaporized non-combustible mixture of air and atomized fuel is brought forward to an exhaust gas stove where the heavier ends are evaporated. The correct amount of air is added at the intake manifold inlet. Throttle valve and inlet manifold remain the same, both as regards function and location, except that the manifold has no hot spot.

By performing the preliminary carbureting action

at the fuel tank, only a slight inlet manifold vacuum is necessary to bring the mixture to the inlet manifold. Fig. 1 shows the general design of the system. Mounted at the inlet of the intake manifold is a mixing chamber incorporating a spring-seated air valve balanced by means of a dashpot. About four-fifths of the mixture entering the manifold represents cold air admitted through this valve, the other fifth being contained in a non-combustible mixture of gasoline vapor and hot air which enters the mixing chamber around the outside of the venturi through pipe A, under direct suction from the intake manifold in proportion to the air velocity. For the full vaporization of the fuel in this mixture the stove B is provided.

Thin Exhaust Pipe

The exhaust pipe passing through this stove has walls only about 0.015 in. thick, so the heat can flow through them readily and cause the vaporization of the heavy ends. The lighter ends of the fuel have already been vaporized during the passage through the $\frac{3}{4}$ in. tube from the fuel tank at the rear. The method of fuel admission at the tank to the air in this pipe is very simple. The inlet air pipe passes down into a container in the gas tank and is equipped with two venturis, in each of which are located gasoline jets, the lower one being for low and the upper for high speed operation. A constant level is maintained in this compartment by a simple poppet valve operated by a cork float, the function being similar to that of the carburetor float.

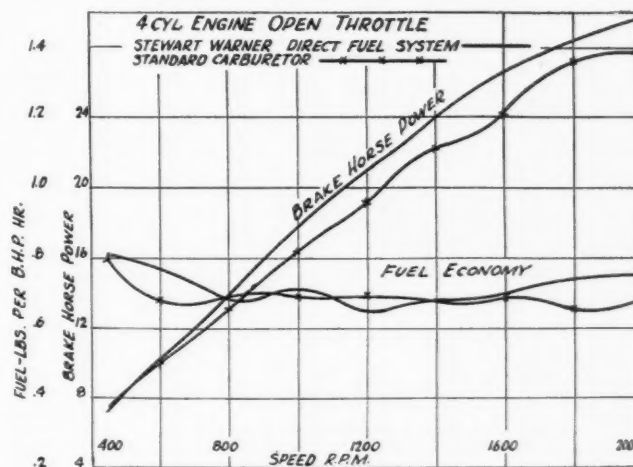


Fig. 3—Open throttle horsepower and fuel consumption curves of four-cylinder stock engine with standard carburetor equipment and Stewart-Warner direct fuel system respectively

As in the conventional carburetor, gasoline entering the pipe is atomized and partly vaporized. The air in the pipe was passed through the muffler before it reached the tank and the heat there absorbed by it assists in the vaporization.

The mixture of partly vaporized fuel and air passes up through the tube shown, which is made on a helical form to insure greater agitation and consequent better vaporization and lower idling speeds. As regards this latter factor, the minimum idling speed is 175 r.p.m. with a straight tube and 150 r.p.m. with a helical type. Other forms can be used, in accordance with different engine designs, air speed requirements, and cost.

Operation of the fuel system is as follows: In starting, a choke button is pulled out, as at present. The

function of this choke is to shut off the air valve in the mixing chamber and thus apply increased suction to the fuel line from the rear. As with normal type carburetors, the mixture entering the manifold is partly unvaporized and very rich. As soon as the engine starts the choke is released. The first few explosions will heat the thin-walled fuel mixture pipe in the stove sufficiently so that the heavier ends begin to evaporate. While the engine is running slowly only jet C admits fuel to the air stream. The lighter vapors evaporate fairly quickly, but some of the heavier ends condense out in the long horizontal tube, thus forming an accelerating well supply. The remainder of the heavier ends pass into that section of the pipe inclosed by the heater, the shape of this section being such as not only to offer more area to the heat of the exhaust gas but also to provide some amount of turbulence and baffling action. The latter two factors insure that the heavier ends in their atomized form are thrown against the wall of the tube, where they are quickly vaporized by the heat.

Rich Mixture Supplied

If the car is next accelerated by opening the throttle, the dashpot D, which is of the air-bleed, plunger type, slightly retards the action of the air valve, permitting a rich mixture to be supplied to the manifold through the fuel feed line. In effect, properly correlated design provides the equivalent of an accelerating pump. The increased velocity of the air in the pipe, due to the air valve restriction, also results in picking up some of the additional condensed fuel in the pipe line in proportion to the throttle opening at the beginning of the accelerating period, thus providing a desirable variation of mixture ratio for accelerating from various speeds, the richness of the ratio being inversely proportional to the engine speed at the start. In other words, its action is that of an automatically graduated accelerating well. As the throttle is opened further, the increased suction in the pipe line also causes a slightly higher vacuum at the venturi E and the fuel jet F, bringing the latter into action. As the accelerating period ends, the dashpot assumes its final position, permitting the air valve to admit the correct proportion of air.

If the engine is now shut off, some vaporized fuel will remain in the system, since it is possible to recondense this only under pressure, and subsequent starting is considerably facilitated due to the presence of the dry gas.

It will thus be seen that with the proper correlated design the various desiderata for a fuel feed system should be fully met:

1. Vaporization is assured by the introduction of hot air, the helical riser tube, a long feed tube under less than atmospheric pressure, and the design of the exhaust interheater.

2. The provision of two jets ample for maintaining correct mixture ratios for varying load and speed conditions, when of properly correlated size and design. The design of the system also enables low idling speeds.

3. As previously mentioned, the proportion of condensed fuel in the pipe line at various speeds provides a graduated accelerating well, the amount of condensate being in inverse proportion to the speed of the engine, with correct design, which is ideal from an accelerating angle. This is assisted by the action of the dashpot.

4. A quick start at low temperature should be made possible by the presence of dry gas vapors in the sys-

tem. Otherwise its action would be similar to that of the normal fuel system with a carburetor, equipped with choke, although a faster warming up is claimed for the direct feed design.

5. High volumetric efficiency is maintained by cooling the vaporized fuel mixture by means of the addition of cool air in the approximate ratio of four to one.

Mixture Non-Combustible

6. As regards fire hazard under normal operating conditions, the gaseous mixture in the pipe line is non-combustible. The pipe itself also seems to prevent the propagation of a flame through it. Attempts to ignite the mixture even at idling speeds, when the gas may have a combustible fuel ratio, so far have proved unsuccessful. Back-firing merely forces smoke back into the tube, killing the flame.

7. The system is considerably simplified by the elimination of the various storage points in the normal system, such as the vacuum tank and the carburetor float chamber, and troubles at these points are also eliminated.

So far no mention has been made of the bearing of this type of fuel feed system on such performance factors as maximum brake horsepower, torque, fuel economy, smoothness of operation, etc. It follows, however, that if the fuel is thoroughly vaporized before it enters the intake manifold, its subsequent distribution in equal proportions to all cylinders is considerably facilitated, resulting in smooth running through equalized power impulses. Furthermore, thorough vaporization should also insure quicker combustion, resulting in higher mean effective pressures and higher horsepower and torque.

As to fuel economy, Stewart-Warner engineers state that with an average automobile engine they are able to obtain a consumption at full throttle of 0.6 lb. p. hp.-hr. without sacrificing other performance factors. The accompanying charts, Figs. 2 and 3, compare full throttle operating conditions on two four-cylinder cars using the standard carburetor equipment and the direct feed system. In furnishing these charts, Stewart-Warner engineers call attention to the fact that they do not represent the ultimate results obtainable, but merely a step in the development work. They also point out that these stock test engines were designed for standard carburetor equipment and no changes in valve or ignition timing were made to allow for the introduction of more fully vaporized fuel. Such changes should result in better fuel economy and even higher power, as larger manifolds can, of course, be used in connection with the earlier valve closing, with correspondingly higher engine efficiency.

Carbon is Minimized

Further claims for the direct fuel system are that it eliminates the formation of carbon, as the fully vaporized fuel will burn more nearly completely; that it permits the use of lower jacket water temperatures; that it reduces the tendency to detonate; that it provides better fuel distribution—ensuring smoother performance—and that it reduces crankcase dilution and its related troubles—wear and corrosion.

From a service angle the system does not present any great difficulties. The chief trouble which might be expected would be in the clogging of the metering jets, and these are so designed and installed as to be quickly removable for blowing out. This service problem is very similar to that encountered with carburetor equipment.

Many Changes *are* Recommended in S. A. E. Standards

Committee reports submitted at Quebec meeting ratified with few exceptions. Revisions made in small aircraft parts in accordance with the latest Army-Navy practice.

THE first technical session of the S.A.E. Summer Meeting at Quebec, Can., this week, was that of the Standards Committee. The report of this committee was quite voluminous, including many revisions of standards for small aircraft parts. The former S.A.E. standards for these parts are being brought up to date in accordance with the latest Army-Navy practice. Proposed standards on small tools and gages also figured in the report to a considerable extent.

Nine divisions of the committee presented reports. The Aeronautic Division recommended the adoption of aircraft battery specifications as an S.A.E. standard. The specifications, which refer to lead-acid batteries only, are as follows:

Bat-tery No.	Num-ber of Cells	Mini-mum Capacity at 5-Hr. Rate, Amp.-Hr.	Mini-mum Current for 20 Min., Amp.	Maximum Over-All Dimensions, In.			Maxi-mum Weight Wet, Lb.
				Length ¹	Width	Height	
32	6 ^a	29½	50	8 1/16	7¼	11¼	38
34	6 ^a	43	75	11½	7¼	11¼	53
36	6 ^a	65	113	14½	7¼	11¼	70

Ratings.—Batteries for combined starting and lighting service shall indicate the lighting ability and shall be the capacity in ampere-hours of the battery when it is discharged continuously at the 5-hr. rate to a final voltage of not less than 1.75 per cell, the temperature of the battery at the beginning of such discharge being

prevent the escape of electrolyte when the battery is turned in an inverted position, or in any position between normal and the inverted position, and allowed to remain in any position for an indefinite period. During this test the electrolyte shall be adjusted to normal level.

Terminals.—Aircraft storage-batteries shall be equipped with wing-nut terminals secured to the top of the battery box in such a manner that vibrations from the external leads will be absorbed by the battery box and not transmitted to the terminal post. Both terminals shall be located on the same side of the battery, with the positive to the right when looking at the terminal side of the battery.

Terminals shall have a 5/16-13 American Standard thread, with tolerances providing a Class 2 fit.

Battery terminals and cable terminals shall be lead coated.

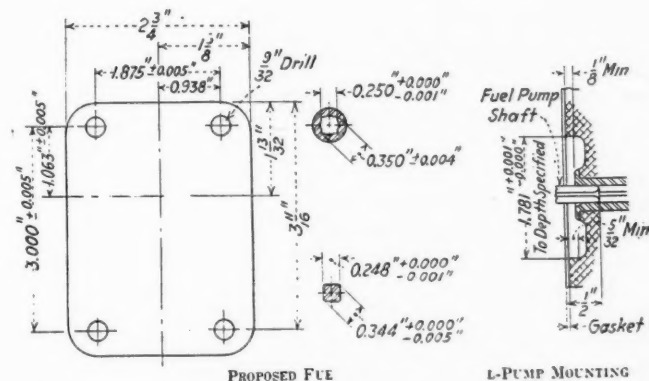
A proposed mounting for tail-skid shoes was also presented by this division. The proposal shows a male jig on which all shoes which conform to the required standard for interchangeability must mount. The proposal has nothing to do with the design of the tail skid proper or the design of the shoe, and refers only to the dimensions of the joint between them.

Revised tables of dimensions for aeronautics castle hexagon nuts, aeronautic plain hexagon-head bolts, aeronautic ball hexagon-head bolts were also presented for adoption.

A sub-division under the chairmanship of Edward P. Warner, after a study of the subject, had recommended to the division the adoption of the AN specifications on eye bolts, flat washers, pulleys, rigid terminals, shackles and turnbuckles, and the division presented these specifications for approval as S.A.E. standards.

Another sub-division had considered the subject of propeller hub mountings and had submitted a report in which it recommended four propeller hub shaft ends, two tapered and keyed, for smaller engines, and two splined, for larger engines. Developments since that study was undertaken had indicated that there is a tendency away from the tapered shaft end even in the smaller engine sizes, and the division therefore did not submit to the committee the larger of the two tapered shaft ends proposed. There was opposition to the standardization of the smaller one, the argument being that the tapered shaft end is being eliminated from practice, and that its standardization by the S. A. E. might tend to retard this natural development.

The Aeronautic Division finally proposed three sizes, the No. 40 (formerly No. 4), the No. 30 (formerly No. 3), which will have 16 instead of eight splines and will be 1 in. shorter, and a smaller size, No. 20.



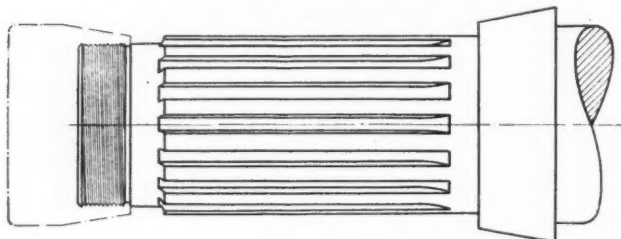
Proposed fuel pump mounting

80 deg. Fahr. The second rating shall indicate the starting ability and shall be the minimum current in amperes that the battery will deliver when discharged continuously at the 20-min. rating to a final voltage of not less than 1.5 per cell, the temperature of the battery at the beginning of such discharge being 80 deg. Fahr.

Non-Spillable Feature.—Means shall be provided to

represents well-established practice. The table herewith gives only the nominal dimensions of the No. 40, while in the final table the limiting dimensions will be inserted instead.

No. 40 Propeller Hub Shaft End



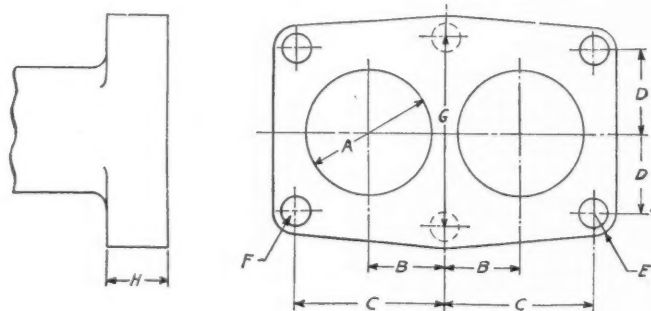
Length Effective	Width	Splines Large Dia.	Small Dia.	No.	Length	Cone Angle Included	Large Dia.
4 1/4	0.304	3.125	2.875	16	1 1/8	30°	3.875

The Aeronautical Division also recommended proposed standard mountings for starters, generators and fuel pumps, and these are shown by the drawings herewith.

The Electrical Equipment Division presented revised tables of two of the present standard cable terminals and recommended the canceling of the standard for the roll-type cable terminal and the continuance of the tubular type with a foot-note to the effect that it is for use only in small production and for service work. The division also recommended the adoption of the open wing type of terminal in place of the tubular type, for quantity production, as it will give better soldered joints and is preferable from the standpoints of assembly and inspection. A table of dimensions of flexible-conduit ferrules was also included in the report of this division.

The Engine Division, considering the growing use of duplex carburetors on eight-cylinder-in-line engines, presented a proposal for duplex carburetor flanges. Either four or six bolts can be used with these flanges. The proposal is embodied in the accompanying table and drawing.

Duplex-Carburetor Flanges



Size, In.	A	B	C	D	E	F	G	H
1	1 3/16	23/32	1 1/2	3/8	5/16	9/32	1 7/8	3/8
1 1/4	1 7/16	13/16	1 5/8	7/16	23/64	11/32	2 1/8	7/16
1 1/2	1 11/16	15/16	1 27/32	7/16	23/64	11/32	2 3/16	7/16
1 3/4	1 15/16	1 1/16	2 1/16	1/2	25/64	13/32	2 3/4	1/2
2	2 3/16	1 3/16	2 3/8	9/16	25/64	13/32	2 11/16	9/16

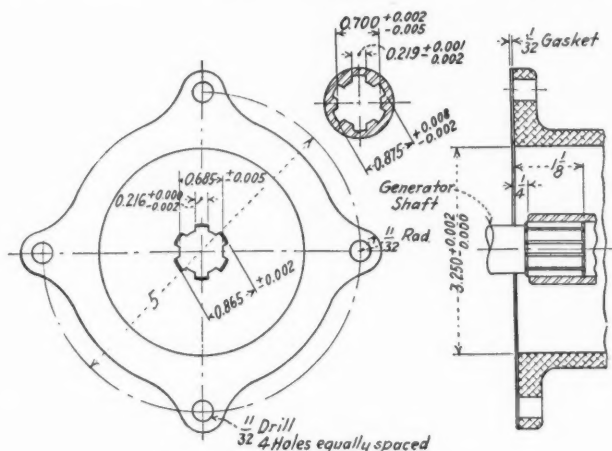
Six-bolt flanges are optional on the 1, 1 1/4 and 1 1/2-in. sizes but are recommended for use as necessary on the 1 3/4 and 2-in. sizes

The division also presented the following table giving the outside diameters and lengths of that portion of carburetor air horns on which air-cleaners are mounted:

Diameter	Length	Diameter	Length
0.750-0.740	5/8	2.062-2.052	1
1.125-1.115	3/4	2.312-2.302	1 1/8
1.500-1.490	7/8	2.625-2.615	1 1/2
1.624-1.614	7/8	3.125-3.115	1 3/4
1.812-1.802	3/4		

This division presented a report on fan belts at the last meeting which was referred back to it because there was some objection to the 38-deg. angle then recommended for all belts, this angle having been used previously only for belts which had to drive a generator or other accessory in addition to the fan. The objection to the 38-deg. angle is said to come from a few large consumers who, because of their size, need not pay a premium on non-standard-angle belts, and the division recommended the adoption of the 38-deg. belt anew. The report also included tables and illustrations of fan belts and pulleys which represent a slight change from the present standard.

A sub-division of the Engine Division had worked out limits for the thread dimensions of spark plugs and the following limits were proposed for 7/8-18 in. spark plug threads and threaded holes respectively: Major diameter, 0.8668-0.8750 and 0.8750 min.; pitch



Proposed generator mounting

diameter, 0.8343-0.8384 and 0.8389-0.8430 minor diameter, 0.8068 max. 0.849-0.8209.

The only difference between the present metric size spark plug and the motorcycle spark plug as listed in the S.A.E. standard being in the limits of thread dimensions, it was proposed that the specification for motorcycle spark plug threads be canceled.

The Iron and Steel Division recommended that the sulphur limit of all S.A.E. carbon and alloy steels be raised 0.005 per cent and that the following note be added to the steel specifications: "Lower limits on sulphur and phosphorus can be obtained in electric furnace steels at the option of the purchaser." It is also recommended that the manganese limits on S.A.E. steels 6120 and 2320 be changed from 0.50-0.80 to 0.30-0.60 per cent, this latter being the range now specified for all similar steels.

The Lighting Division recommends closer tolerances on lamp sockets and bases, and proposed additional dimensions on the slot in the socket and a dimension from the top of the pin to the open end of the base. The report also included specifications of double contact and triple contact heavy duty connectors for use with multiple signal lamps and headlamps.

The Passenger Car Division recommended that the present specifications for car frame numbers be canceled, as variations in frame design prevent the appli-

Next Week's Issue

Will contain a detailed account of the happenings at the S.A.E. Summer Meeting in Quebec. The highlights of each session will be presented, with abstracts of the papers and discussions.

cation of the numbers in any specified place. The division also recommended that the present specification for car performance tests be canceled, because differences in engineering opinion and in equipment available make it impossible to use a standardized test.

A number of changes in the specifications for plate glass were recommended, the most important being the elimination of the phrase "glass sizes *** shall be selected in increments of even 2 in." and a change in the specification for thickness which is now to read as follows: "The thickness of plate glass shall be 7/32 in., with tolerances of plus and minus 1/16 in., with variations in individual plates of not more than 1/64 in."

Static load and impact tests were recommended for steering wheels. In the static load test the wheel is placed in a Tinius Olson or similar machine, supported by the rim midway between spider arms, on two steel blocks approximately two in. square, diametrically opposite each other. Tests are made on the wheel in both directions. Load is applied to the hub slowly and uniformly until initial failure occurs, which is noted, and the loading is then continued until complete failure occurs.

In the impact test the wheel is supported rigidly at the hub, by means of a belt passing through the hub and a steel block clamped to the bed of a drop hammer. Impact is applied by means of a 20-lb. weight working freely in vertical guides. The weight is allowed to drop from a measured height onto the rim midway between spider arms, the shock being cushioned by means of a 3/8 in. pure para sheet, 4 by 5 in., which is clamped over the rim at the point of impact. The distances which the weight is dropped to cause (a) initial failure and (b) ultimate failure and the character of the failure are noted. This test, too, is made on the wheel in both directions.

Continental "Hydro-Check"

CONTINENTAL MOTORS CORP. has announced details of the new Continental "Hydro-Check" shock absorber, which will be marketed as an addition to the regular Continental Motors line.

One of the features of the new device is a "free center." As long as the shock absorber arm remains in this central free zone it works against a cushion of air only, but when the arm passes out of this zone it encounters resistance due to the throttled flow of oil.

The shock absorber is of plunger type, with black enameled cast-iron housing and parts of hardened steel. The interior is divided into high and low pressure compartments, each containing both oil and air. A piston, operating in the high pressure chamber, is actuated by the arm through a rocker shaft and cam located above oil level in the low pressure chamber.

When the car strikes a bump, and frame and axle approach each other, tension is removed from the arm

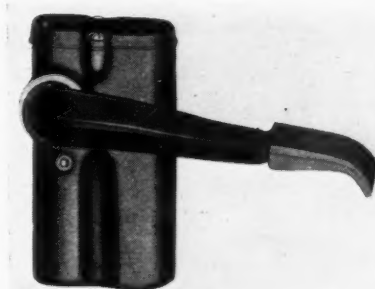
and cam, and the helical return spring inside the piston causes it to rise, thus creating a partial vacuum in the high pressure chamber and drawing oil through an intake port in the chamber bottom which is fitted with a ball check valve.

On the rebound the arm and cam depress the piston, cushioning the shock against the air, which is thus compressed and in turn operates against the oil. As the piston moves downward, oil escapes slowly from the high pressure chamber back into the low pressure chamber through a needle valve seepage port located low down in the partition between the two chambers.

Should pressure from a heavy jolt become so great in the high pressure chamber that consequent checking action endangers the mechanism, a relief valve, held in place by a spring and sliding in the circular wall of the intake port below the check valve, is forced open to permit additional seepage by way of the intake port itself.

The "free center" air cushion is maintained above oil level in the high pressure chamber by means of a replenishing port in the piston skirt at a point that permits air to enter from the low pressure chamber as each piston stroke lifts the port above the semi-circular partition between the two chambers. Thus on each down stroke of the piston, air is trapped in the high pressure chamber.

The needle valve is adjustable from the outside, leakage being prevented by packing and a straight-threaded plug. The refilling port, which is located above the oil level to prevent leakage, is closed by a pipe plug. The rocker shaft and cam comprise a unit separate from the arm, the shaft being inserted in the arm through a broached hole with flats on the sides.



The Hydro-Check shock absorber

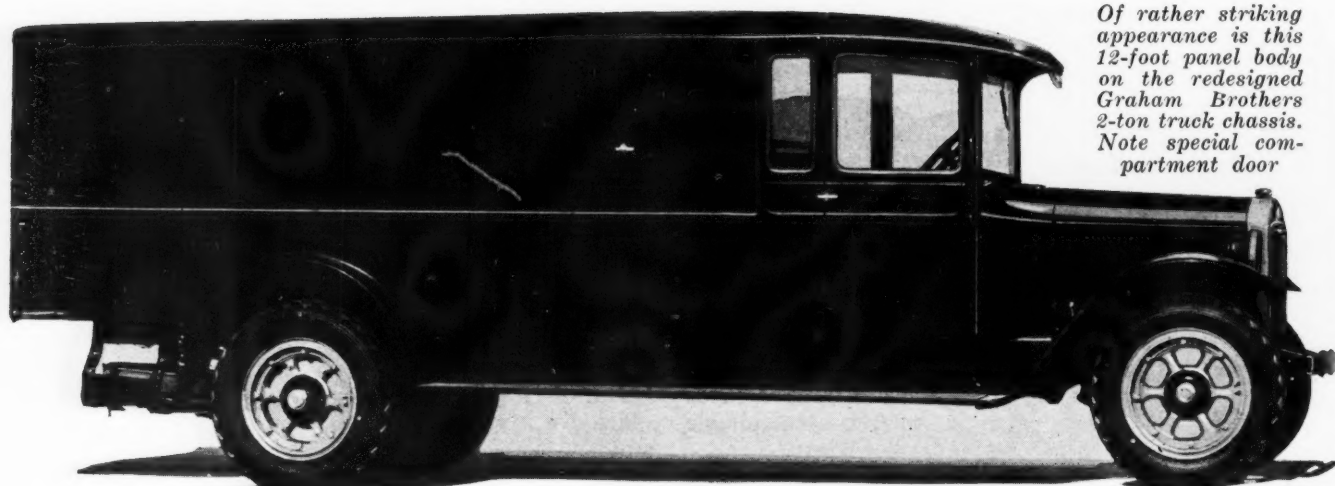
Trade Association Merger

(Continued from page 996)

the A.E.A., the M.&A.M.A. has, of necessity, shown a marked development in its service to its members, in marketing and distribution activities. These services cover a wide range of topics that have been considered particularly substantial and valuable. This work is under the direction of Neal G. Adair.

The preliminary arrangements of the M.&A.M.A. in connection with the merger are being handled by M. L. Heminway, general manager, and the following officers and directors: J. L. McComb, Crucible Steel Co.; M. A. Moynihan, Gemmer Mfg. Co.; M. B. Ericson, Biflex Products Co.; L. A. Safford, McQuay-Norris Mfg. Co.; W. T. Morris, American Chain Co.

For the A.E.A. the following are in charge: A. C. Storz, Storz-Western Auto Supply Co.; W. C. Hecker, Curtis Pneumatic Machinery Co.; E. R. Seager, Pennsylvania Rubber & Supply Co.; W. S. Isherwood, AC Spark Plug Co.; W. E. Wissler, Herring-Wissler Co., and G. B. Shearer, Gaul, Derr & Shearer.



Of rather striking appearance is this 12-foot panel body on the redesigned Graham Brothers 2-ton truck chassis. Note special compartment door

All Graham Trucks are Redesigned With Six-Cylinder Engines

Four-wheel internal brakes and four-speed transmissions are other features of new line announced this week. Prices slightly higher. Victory engine in four models.

WHAT amounts practically to a complete new line of trucks is being announced this week by Graham Brothers. Ranging from 1000 to 5000 lb. in capacity, the new models feature six-cylinder engines throughout, four-wheel internal brakes on all models, four-speed transmissions on all except the two smaller capacities, and increased wheelbases.

While chassis prices on all except the 2-ton are somewhat higher than formerly, the increase in cost is more than offset by the additional features now offered, providing greater flexibility, increased load capacity, higher road speeds with safety, and smoother performance. Following are the new six-cylinder chassis prices compared with the prices of the corresponding four-cylinder models, and the former six-cylinder 2-ton model:

Model	New Price	Old Price	New Weight lb.
Merchants Express.....	\$665	\$570	.....
Commercial Truck.....	775	670	2510
1-1 $\frac{1}{4}$ ton short	995	895	2920
1-1 $\frac{1}{4}$ ton long	1,065	980	2955
1 $\frac{3}{4}$ ton short	1,345	1,295	3695
1 $\frac{3}{4}$ ton long	1,415	1,365	3810
2 $\frac{1}{2}$ ton short	1,595	1,595	3930
2 $\frac{1}{2}$ ton long	1,665	1,665	4070

The price of the Merchants Express model equipped with panel body is now \$845, as compared with \$770 for the former four-cylinder model.

Standardization of various chassis parts is another outstanding feature of the new line, and helps to reduce manufacturing costs. For instance, the engines of the Merchants Express, the Commercial Truck and the 1-1 $\frac{1}{4}$ and 1 $\frac{3}{4}$ ton are practically interchangeable, the only difference being in the type of front and mounting used on the Merchant's Express. The engine itself has been developed from that used in

the Dodge Victory Six, the most important differences being in the cooling system. In all except the Merchants Express model, a new water outlet connection is used, incorporating a thermostat, and a water thermostat is mounted on the dash. In addition, a manually-controlled radiator shutter is furnished, which is standard equipment on all except the Merchants Express. On the Commercial Truck, the 1 $\frac{1}{4}$ -ton and the 1 $\frac{3}{4}$ -ton models, the fans have been enlarged. The engine in the Merchants Express is provided with a pressed-steel timing chain cover on which there are two engine supports, the same as on the passenger cars, while the larger trucks equipped with this engine have a single front support, the timing chain cover being cast and provided with a stud for attachment to the front cross-member.

The new engine used in the six smaller models has a bore and stroke of 3 $\frac{3}{8}$ by 3 $\frac{7}{8}$ in., giving it a piston displacement of 207.99 cu. in. Features of the engine are a fully machined 2 $\frac{1}{2}$ -in. seven-bearing crankshaft, fully machined combustion chambers, aluminum alloy four-ring invar strut pistons and lubrication by pressure to main, connecting rod and camshaft bearings.

In the case of the Merchants Express the adoption of a six-cylinder engine has led to an increase in wheelbase of 2 in. Midland Steeldraulic four-wheel brakes of the internal expanding type with 12-in. diameter, 2-in. width drums are used on this model and are supplemented by a 6 $\frac{1}{4}$ in. diameter, 2 $\frac{1}{2}$ -in. width propeller shaft brake. Other chassis units of the model include a 10-in. Borg & Beck clutch, a three-speed transmission and a Spicer one-piece propeller shaft. A standard ratio of 4.455 to 1 is used in the rear axle with 29 by 5.00 tires. Either a Stromberg or a Stewart carburetor is furnished at the option of the purchaser.

Aside from the engine there are several other units which are interchangeable on the Merchants Express and the Commercial Truck models. They use the same transmission, clutch and universal joints. Among the important improvements on the Commercial Truck is the adoption of a straight frame, as the elimination of a kick-up at the rear axle makes this chassis better adapted for mounting special bodies. In connection with this change the axle has been redesigned with a new spring mounting and the provision of new brake mountings with the adoption of Lockheed internal hydraulic brakes. The propeller shaft brake, which supplements the four-wheel service brakes, the latter having 14-in. diameter by 1 $\frac{3}{4}$ -in. width drums, is also interchangeable with that used on the Merchants Express chassis. Only one rear axle ratio is available for the Commercial Truck, this being 4.727 to 1, but either 31 by 5.25 balloon or 33 by 4 $\frac{1}{2}$ high pressure tires are available, the latter at extra cost. Front springs on the Commercial Truck, as on all larger models, have been increased in length to 39 in., while the wheelbase on this model has been lengthened 4 in. to 120 in. A channel-type front bumper is now standard equipment.

"Hiflex" Transmission

An outstanding feature of the 1 $\frac{1}{4}$ -ton truck, which is a development from the former G-Boy, is the adoption of the internal gear, four-speed, "Hiflex" transmission. This marks the introduction of this transmission in the truck field. This gearset uses a shift similar to that of the former Dodge, with low speed to the left and back, second forward to the left, third to the right and back, and direct forward to the right. Shift into reverse is obtained by latching out to the left and back. Gear ratios of this transmission are 4.659 to 1 in low; 2.496 in second, and 1.422 in third.

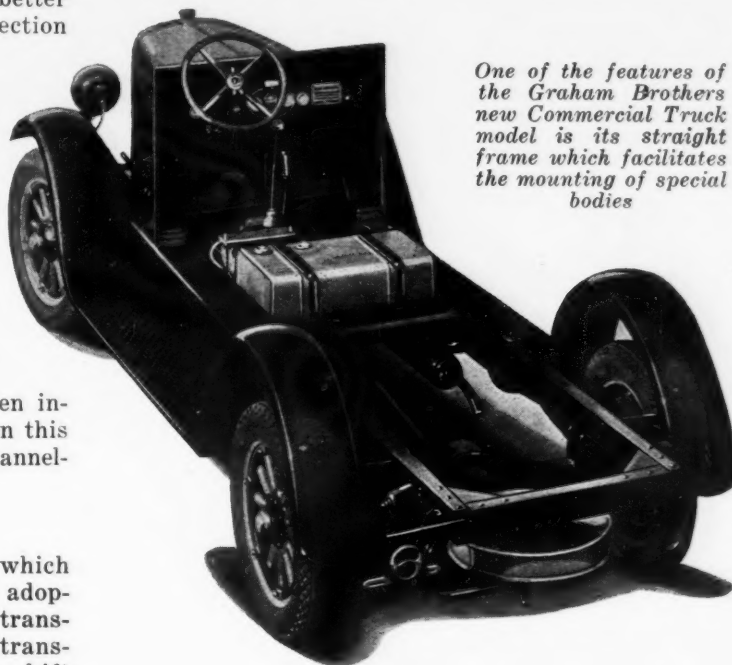
On this model the same 11-in. Borg & Beck clutch is used as on the longer trucks. One change in design made in the shorter 1 $\frac{1}{4}$ -ton truck to provide a better drive is the adoption of a two-piece propeller shaft provided with three Universal Products Co. joints and a self-aligning center ball bearing. The adoption of the double Timken wheel bearings at the wheels is also a new feature in the rear axle of this truck. The axle has a standard ratio of 5.1 to 1, with 30 by 5 heavy-duty tires. An option of 5.667 to 1 is available without charge while 33 by 5 high pressure cords are listed at extra cost. As on all of the larger trucks, four-wheel internal hydraulic brakes are fitted to this model, these having 15-in. drums and taking 2-in. width linings. A mechanical propeller shaft brake supplements this system, the drum being 8 in. in diameter and 2 in. wide.

Wheelbase Increased

An increase of 4 in. on the short and 3 in. on the long wheelbase model gives the 1 $\frac{1}{4}$ -ton truck wheelbases of 130 and 140 in. respectively. On both models front springs have been increased in length to 39 in., while on the short wheelbase model the rear spring has been lengthened to 48 in. The steering gear is of the Ross variable ratio type.

The new edition of the 1 $\frac{3}{4}$ -ton truck is also replete with mechanical changes. Aside from the adoption of the six-cylinder engine interchangeable with that of the 1 $\frac{1}{4}$ -ton truck, wheelbase has been increased to 150 in. on the short and 165 in. on the long wheelbase model, the short model now taking a 10 ft. body. An important change is the increase in tread to 60 $\frac{1}{4}$

in. which reduced the turning radius and also enables the use of chains with dual tires. The latter in 32 by 6 in. 10-ply size, front and rear, are standard equipment on this model, while 32 x 6 eight-ply on dual rims are offered on the rear, being mounted on Clark malleable iron, spoked wheels fitted with two rims. Third-



One of the features of the Graham Brothers new Commercial Truck model is its straight frame which facilitates the mounting of special bodies

ty-four by 5 front and 36 by 6 rear tires are also available at lower cost, if desired. The four-speed transmission is retained, but the standard rear axle reduction is now 5.667 to 1, a reduction of 6.375 to 1 also being available without extra charge. Front springs have been increased to 39 in. in length on this model also. Brake drums are 16 in. in diameter and 2 $\frac{1}{4}$ in. wide, the propeller shaft brake remaining unchanged.

Two-Piece Propeller Shaft

Changes on the 2 $\frac{1}{2}$ -ton are relatively fewer in number. The engine, which was developed from the Dodge Senior Six powerplant last year, is retained, as is the four-speed transmission, the 11-in. Borg & Beck clutch and the rear axle. On this model also a two-piece propeller shaft with three Universal Products Co. joints and a self-aligning center bearing is used. The standard rear axle reduction is 6.375 to 1, a reduction of 5.667 to 1 being also available without extra cost. Thirty-four by 7 in. rear tires are standard, while 32 by 6 in. dual rear tires are available at extra cost. Brakes, both service and emergency, springs and steering gear have been made interchangeable with the 1 $\frac{3}{4}$ -ton model. As on the latter, the tread has been increased to 60 $\frac{1}{4}$ in. The wheelbase now is 150 in. for the short and 165 in. for the long model.

Not only in mechanical design but also in the cabs and bodies have changes been made. Cabs are interchangeable on all except the Merchants Express. The cabs have been increased in length 3 in. for greater comfort, and new type cushions were adopted with the same end in view. A total of over forty body models are available for the five basic trucks. Air cleaners and oil filters are standard on all models, while a gasoline filter and integral front bumper are furnished on all except the Merchants Express.

Factory Service Managers Indorse Flat Rate System

Majority at N. A. C. C. Forum favorably inclined toward use of standardized repair prices by dealers, but opinion differs as to certain features of application.

By Sherman Swift

THE increasingly thorough manner in which the factories are promoting good service principles among their dealers was brought out at the Factory Service Managers' Forum of the National Automobile Chamber of Commerce, held last week in Toronto. Covering a wide range of subjects, the discussions and papers emphasized the thought that service is the master salesman of the industry, and that owners who receive good service from the dealer will come back to him when they are again in the market for automobiles.

The convention, which had an attendance of 150, was marked by an unusual degree of earnestness on the part of the delegates and the discussions that followed such of the papers as lent themselves to discussion, indicated the vital importance of "More Factory Help for Dealers' Service," the general subject of the convention, to those present.

Among the addresses given, taking them in the order of presentation, were: "How the Factory Can Help the Dealer Improve His Service," by A. K. Steigerwalt, service manager, Durant Motors, Inc., and "Installing Flat Rate and Selling Service," by H. M. Wiegand, service manager, Dodge Brothers.

These papers, which followed the preliminary opening addresses of the first session, interlocked to stress the importance of flat rates as a means of increasing owner satisfaction, and the discussion that followed was all decidedly favorable to the system as a whole, although there were sharp differences of opinion with regard to certain features of application.

On the question of whether or not an effort toward standardizing flat rates should be made, it appeared to be the feeling of the majority that it was impracticable to have the same service chargers for all parts of the country and testimony to substantiate this argument was advanced by several.

Difficult to Tell Cost

With regard to the question of whether or not a flat rate should include a lump sum for labor and materials, another diversity of opinion was recorded. The majority, while appreciating the desirability of telling the car owner exactly what a job would cost inclusive of labor and materials, was of the opinion that the average dealer, in most cases, would not be justified in giving other than a flat labor charge until he knew the condition of the parts in the job to be done, which could not be ascertained until the job was disassembled.

A showing of hands regarding factory policy in the matter of recommending flat rate systems proved that with few exceptions such recommendations were favored, in one way or another.

The paper starting the Monday afternoon session was given by F. A. Oberhue, sales manager, United Motors Service, Inc., who made a fine appeal for specialized service stations and presented reasons why dealers should not try to do work for which they were not properly equipped. He stressed the importance of dealers knowing what was needed and the cost of the work, but felt that usually they would be better off if the work were done by shops especially equipped to do it. Much discussion followed the presentation of this paper, the title of which was "Specialization in Maintenance," and one speaker, in a talk on the same subject, advanced the opinion that the factory and dealer should not take away profit-making lines of operation from the specialist or independent service station. If this were done, he said, they would be forced out of business and would not be on hand to take care of the odds and ends that the dealer does not care to handle.

Diagnostician Needed

This speaker favored the car dealer having a capable diagnostician and sending special work to a specialist unless he has volume sufficient to pay him to have an entire department for handling that special job, whatever it might be. He advanced the opinion that the owner does not care where the job is done, but is more interested in having it done properly.

"Profitable Use of Shop Equipment," by L. Z. McKee, Weaver Mfg. Co., was an appeal for the use of shop equipment as a means of increased profit. Seemingly all delegates agreed with the speaker's remarks as there was little discussion following the presentation of the address.

"Packing of Parts for Dealer Shipments," by Charles J. Zusi, chief engineer, Container Testing Laboratories, told of the ways developed for the economical packing of parts, in such a way that they would stand rough handling without injury, and told how shipping containers could be salvaged for future use. This address was illustrated with interesting slides and was of great interest to the delegates, many of whom commented favorably on the facts brought out by Mr. Zusi.

"The Human Element in Service," by H. B. Lewis, vice-president, Commercial Credit Co., opened the Tuesday morning session. He stressed the personal contact angle of the business.

"From the dealer's standpoint," said A. R. Sandt, sales section, General Motors Corp., in the course of his paper on service parts marketing, "if the factory has made proper discount and stock availability provisions, I think he is rather short-sighted if he buys competitive merchandise. That is, if the dealer buys service

parts from sources other than provided by the factory he reduces himself to the same standing as all other service stations in his trading area. In other words, he is afforded no protection for the wholesale business he may enjoy with competitive service stations.

"Furthermore, if the dealer feels that it is his prerogative to split up his sources of supply so as to obtain the greatest profit margin, I wonder how he would feel if the factory withdrew its most popular models and sold them through the retailer making the best offer so that the factory could enjoy the greatest profit margin."

Further Work Necessary

Mr. Sandt's address was the subject of considerable discussion. The importance of obtaining a wider distribution of factory parts was appreciated, but there was a difference of opinion as to how this was to be accomplished. The consensus of opinion appeared to be that further work along this line by the car makers is necessary in order to obtain a maximum business from this source.

"Scientific Brake Testing and Adjustment," by F. W. Parks, vice-president, Cowdrey Brake Tester Organization, stressed the owners' appreciation of the necessity of proper brake adjustment and the advisability of specialized equipment to sell the owner on the availability of such adjustment. Comment on this paper was all favorable, though one speaker thought that the average dealer needed a better insight into adjusting brakes than he has had heretofore and another questioned the necessity of expensive equipment, believing that knowledge of how to do the job was of paramount importance. It was quite generally agreed that the average dealer does not pay enough attention to the profit possibilities of this branch of the business.

"Service Operations of General Motors of Canada," by C. E. McTavish, general parts and service manager of General Motors Products of Canada, Ltd., was a particularly interesting resume of the way in which service has been developed in Canada where car owners and dealers are separated by such wide expanses of territory.

In speaking of the highly successful flat rate system that General Motors of Canada has developed for its dealers, Mr. McTavish stressed the necessity of cooperation of the dealer before the plan can be successfully put into practice.

Must Be Installed Gradually

He stated that it is practically impossible to attempt to put in the complete flat rate system at one time and gave the following steps as necessary: (1) Clean up the premises; (2) make the layout as efficient as possible; (3) see that necessary tools and equipment are installed; (4) see that parts stock is ample; (5) put in flat rates to owners; (6) then and not until then, put in flat rate compensation to mechanics.

Good service is impossible, said Mr. McTavish, unless suitable premises are used. In his opinion, too many dealers still have the idea that any kind of building is good enough for service. Anyone who has that idea is certainly short-sighted, said Mr. McTavish. The attractive place attracts custom while the unattractive place repels. No matter how small the building, it can be attractive and the degree to which it attracts trade is in direct relationship to the profit it will make for the dealer.

The two final addresses of the forum were given by A. S. McArthur, superintendent of the garage depart-

ment of the Toronto Transportation Commission, who spoke on the maintenance work of that body and illustrated his remark with slides; and a paper by J. L. Kenyon, service manager, Chrysler Motors Corp., on handling export service, which was read by Mr. Jaroske in the absence of Mr. Kenyon. M. R. Denny, of General Motors Export Co., though not scheduled to speak, followed the presentation of this paper and told of the work that General Motors Export is doing with regard to assembly plants and parts and service set-ups in foreign countries.

E. P. Chalfant, executive secretary of the National Standard Parts Association, though not on the program, was present and made a short address to the delegates. He spoke in commendation of flat rates, saying that they were "the preservation of the industry."

Charles D. Hastings, chairman N.A.C.C. service committee, called the forum to order and the Hon. George S. Henry, minister of public works and highways, Ontario, made the address of welcome. The forum was in general charge of H. R. Cobleigh, who also took part in the general discussions.

It was planned to hold next year's meeting in May.

Gunite Brake Drum

PRESSED steel brake drums with linings of Gunite, a newly developed wear-resisting metal, are now being marketed by the Federal Pressed Steel Co. of Milwaukee. Gunite is a new graphitic steel, showing pearlite in its microstructure. As may be seen from the microphotograph reproduced herewith, which shows the section magnified 100 diameters, short, plump graphite flakes are evenly distributed in the pearlitic matrix. These flakes of graphite are said to perform the function of a lubricant and to prevent the Gunite from tearing and scoring under heavy friction. In service the Gunite becomes highly polished, and drums



Microphotograph of Gunite (100 diameters)

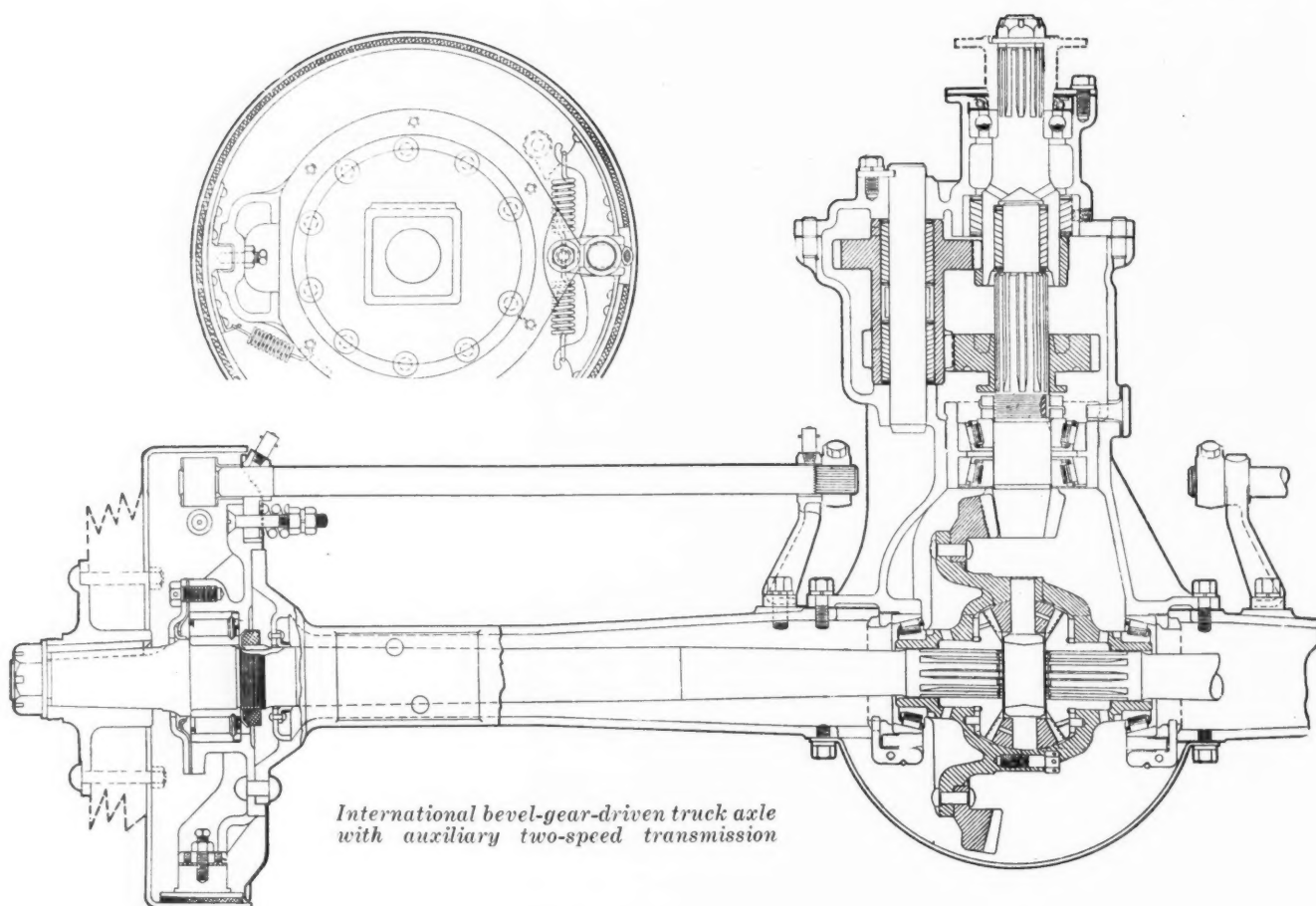


Federal Brake drum with renewable liner of Gunite

with this lining are said to give from three to five times the life to brake lining that is obtained with ordinary drums.

The Gunite liner in the new Federal pressed steel brake drum is replaceable, being fitted inside the drum and securely held from crawling under braking forces by slots pressed in the drum.

ACCORDING to the Bureau of Mines, the world's production of aluminum in 1927 reached 200,890 tons. The United States had the largest production, 71,425 tons, followed by Germany with 31,250 tons, Canada with 26,785 tons, Norway with 20,535 tons, France and Switzerland with 19,640 tons each.



*International bevel-gear-driven truck axle
with auxiliary two-speed transmission*

International Harvester *Truck* Has *Two-Speed* Driving Axle

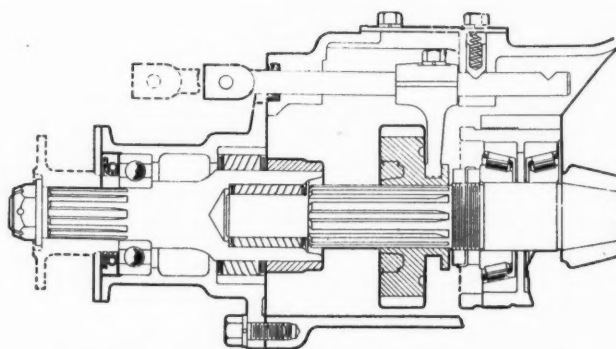
Is used with three-speed transmission and gives new 1-ton model six forward speeds. Engine is four-cylinder Waukesha developing 34 hp. at 2500 r.p.m.

A ONE-TON truck with a two-speed driving axle which, together with a three-speed transmission, gives six forward speeds, has been introduced by the International Harvester Co. The reductions between the engine and the rear axle range from 5.33 to 1 when the drive is direct all the way through, to 52.71 when both the transmission and rear axle are in low gear. This great range in gear ratios virtually gives the truck passenger car speed on the road, while at the same time it enables it to negotiate heavy grades, fields, etc., when under load.

Four-Cylinder Engine

The engine is a four-cylinder, of Waukesha make, with Ricardo head, and has a bore of $3\frac{1}{2}$ in. and a stroke of $4\frac{1}{2}$ in. It develops 34 hp. at 2500 r.p.m. The clutch is a Rockford of the dry plate type, and the transmission a Mechanics Machine, having three forward speeds, which is built in a unit with the engine. The reduction ratios of the transmission are 3.4 to 1 in low, 1.95 to 1 in second and 4.45 to 1 in reverse.

Propeller shafts and universal joints are of Mechanics Machine Co. make, the universals being of the split ring type with oil lubrication. A cam-and-lever-type Ross steering gear is fitted. The front axle is the Eaton No. 501-F, which has an I-beam center and El-



Vertical section through two-speed driving mechanism

liott type steering knuckles. The drag link runs in the fore-and-aft direction. The rear axle is the international-Eaton N. 1124, of the two-speed type, with a standard gear ratio of 5.33 to 1 in direct and 15.5 to 1 in low gear. This gives the following list of six overall gear ratios for forward drive: 5.33, 10.39, 15.5, 18.12, 30.23 and 52.7.

The rear axle is primarily a spiral bevel gear type with the wheel hubs keyed to the axle drive shafts. The axle housing is a malleable iron casting of the true banjo type, with the differential, driving gears and two-speed mechanisms assembled on a carrier which can be removed from the front. In the rear, the axle housing is provided with a large pressed steel cover plate which facilitates bearing and gear adjustment and inspection of the interior.

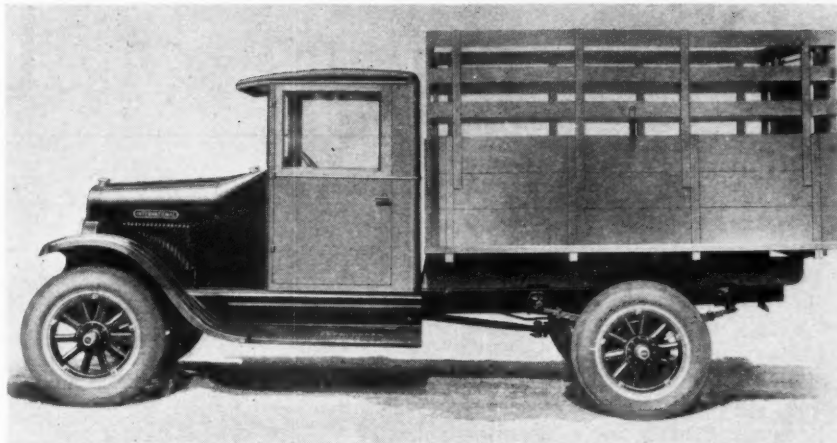
Two-Speed Mechanism

The two speed driving mechanism consists of a main drive gear with integral shaft, in the rear end or gear portion of which the shaft of the rear axle bevel pinion is piloted. This shaft is cut with 10 splines, and the sliding gear for the high and low speed ranges is adapted to be slid along it. A countershaft is mounted to the left of the main driving gear and pinion, in an extension of the malleable carrier. This countershaft is anchored and therefore does not revolve, but it carries an integral two-gear cluster on Hyatt bearings which is constantly enmeshed with the main drive gear.

The shaft of the main drive gear is mounted on a ball bearing at the front and on a Hyatt at the rear directly adjacent to the gear. The rear portion of the main-drive-gear teeth is reduced in depth and this portion of the gear teeth engage with similar internal teeth in the sliding gear on the pinion shaft for the direct drive. When the drive is through the low speed the sliding gear is in its rearward position, with the direct connection between the main drive gear and pinion shaft broken. Power is then transmitted from the main drive to the countershaft cluster, thence to the sliding gear and to the splined shaft of the spiral bevel pinion. The pinion is mounted on opposed Timken roller bearings directly back of it, which are carried by a threaded and piloted cage provided for gear tooth adjustment. Travel of the sliding gear is controlled by a yoke on the slider rail mounted on the carrier above.

Shifter Lever in Center

The shifter lever is conveniently located in the center of the driving compartment. Gears and shafts are of alloy steel, drop forged, carburized and case-hardened, after which they are given a toughening treatment for the core. The axle driving shafts are of heat-treated chrome-molybdenum steel, and are



International Harvester one-ton truck with two-speed axle

tapered and provided with fillets to prevent localization of stress.

Service brakes are of the expanding band type and act on the inside of rear wheel drums. These brakes are actuated by a camshaft with cam mechanism of the tongue and lip type. At the rear the brake band is supported by a sliding dog,

which gives a floating action. The whole axle is very similar to the axles used on other International speed trucks, except for dimensions.

American War Trucks Entered in French Tests

FOUR Liberty (American Class B war model) trucks, entered as the Willeme, are taking part in a French military competition with a view to securing army subsidies. This is an annual test for 7½-ton trucks required by the army for the transportation of war tanks, the Government seeking to encourage the use of this type among civilians by offering a purchase subsidy and an annual maintenance subsidy to users of the approved types.

The trucks are required to spend practically one month on the road under direct military observation, during which time they will be tested for regularity, operating in convoy formation, hill climbing, towing and loading of tanks by means of the winch.

The five firms competing in the trials are Willeme (Liberty), Renault, Somua, Berliet and Dewald. Each firm has entered four trucks, two of them running on gasoline, and two on charcoal gas, for the French army shows a preference for this type of fuel because it is home produced.

The trucks running on charcoal gas have slightly bigger engines than those using liquid fuel, the Berliets, for instance, having six cylinders of 4.3 by 5.5 in. bore and stroke, compared with four cylinders of the same size for liquid fuel. The compression ratio is higher, generally being 6 to 1, compared to about 4.5 to 1 for the gasoline engines. Each truck is equipped with a winch for loading the tanks and electric lighting and starting are furnished in all cases. In view of the high compression of the engines operating on charcoal gas, the starters are geared down, ratios of 15 to 1 being common.

Correction

IN a table showing the physical properties of various alloy steels, which accompanied C. N. Dawe's article on Normalized Steel, in our issue of June 9, the ultimate strength of the steel containing 0.49 carbon, 0.80 manganese and 0.18 vanadium, appeared as 160,250 lb. per sq. in. This was a typographical error. The correct figure is 106,250 lb.

New Developments of Interest

Diamond Boring Machine

A NEW general purpose single-spindle diamond tool boring machine has been put in production by the Automatic Machine Co. of Bridgeport, Conn. This same concern is the manufacturer of a two-spindle machine which is now widely used in the automobile industry for diamond-boring connecting rod bearings, piston bearings, etc. This latter machine is strictly a single purpose machine, operating automatically on the cyclic principle. Recently, partly as a result of the tendency of car manufacturers to increase the number of their lines, there has arisen a demand for a machine which, while possessing the fundamental requirements in diamond-boring, such as rigidity and very accurate guiding of the spindle, can be readily shifted from operation on one particular part to operation on another. The Coulter single-spindle diamond-tool boring machine illustrated herewith was developed for this purpose.

This machine is adapted for diamond-boring of pistons, bearings, bushings and any other parts of non-ferrous materials. It will bore a hole of any reasonable size up to a depth of 6 in., the limit on the depth of the fixture being 12 in. The fixture platform of the machine measures 12 by 22 in. and the floor space required is 30 by 36 in.

A 3 hp. constant speed (1800 r.p.m.) electric motor

Machine Tools and



serves to drive the machine. It is located inside the column, with only the pulley projecting. A belt from the motor pulley drives a horizontal shaft at the back of the column, from which latter the spindle is driven through another belt running over adjustable idlers.

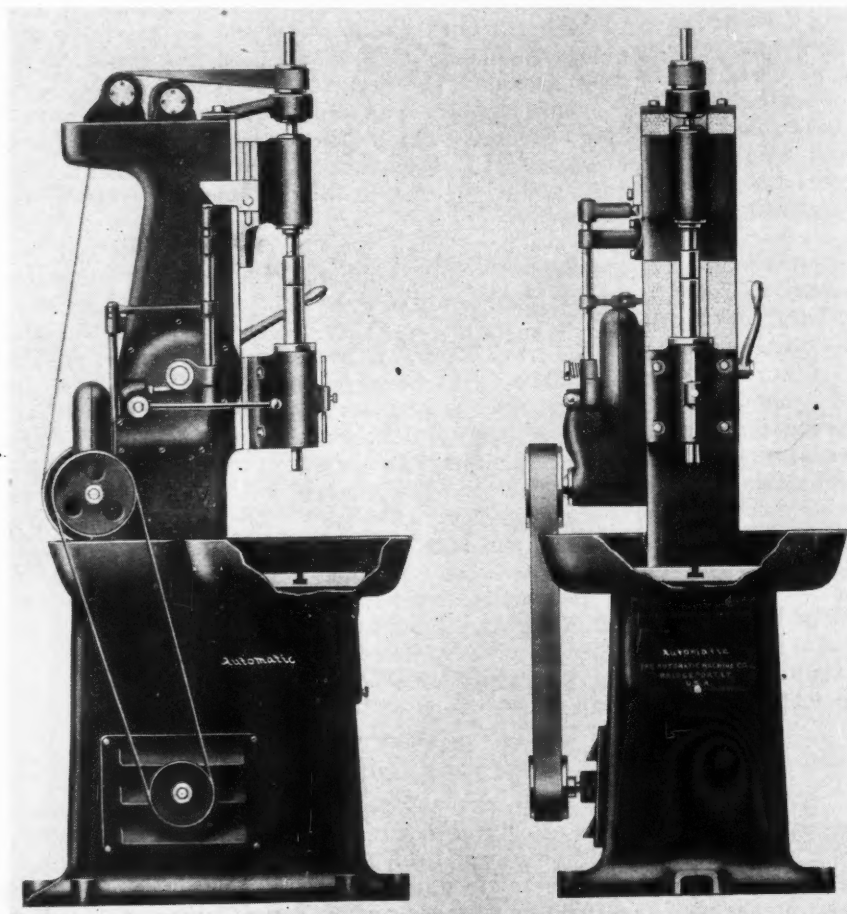
The column of the machine above the splashpan is of the open-side box-section type, and inside of it the feed mechanism is located. The driving spindle runs in a bronze-bushed bearing approximately 9 in. long. The journals are tapered, with the larger diameter at the upper end of the bearings, and the spindles are provided with ring adjusting nuts to make it possible to compensate for wear of the bearings. Ball bearings above and below the spindle pulleys sustain the radial load produced by the tension of the belt, relieving the lower bearings of all such load.

The entire head moves up and down on the column, its downward movement being controlled by a steel belt forming part of the feed mechanism. The head is counterbalanced, and its return requires only a slight pressure on the quick-return lever. The rate of feed is determined by the ratio of the gearing to the feed mechanism.

The boring car, which is separate from the spindle that drives it, passes through a cast iron sleeve bearing located directly below the driving spindle. The bar is connected to the driving spindle by means of a floating coupling of the Oldham type, having a taper shank that extends up into a taper hole in the spindle, and a similar shank connected in the same way with the boring bar, extending the spindle either above or below the coupling.

In the cycle of operation, the boring spindle is brought to the boring position manually, and the starting lever is tripped, causing the automatic feed mechanism to become operative and the boring spindle to rotate. The boring continues to a predetermined depth, at which point the machine stops automatically. The operator then returns the boring spindle to the starting position manually, through the use of the quick-acting spindle return lever. It is also possible to overbalance the head so it will return automatically.

Provision has been made for the



Coulter general-purpose single-spindle diamond tool boring machine, side and front views, with portions of splash pan cut away to show work platform

to Automotive Production Men

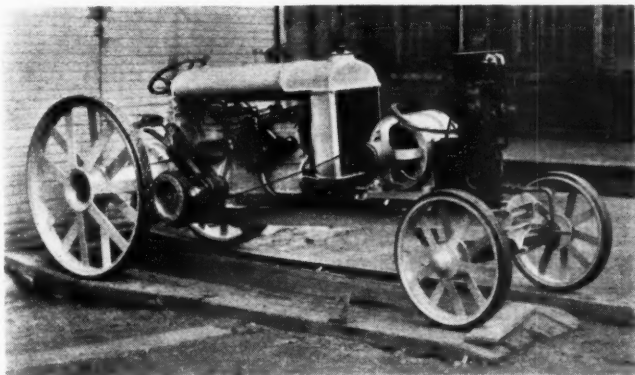
Other Shop Equipment



use of a variety of work-holding fixtures. Diamond tool holders are interchangeable in the end of the boring bar as required for in different depths and diameters of the work.

Mounting for Arc Welders

THE Pontiac Tractor Co., Pontiac, Mich., has developed a new mounting for Lincoln Electric stable arc welders. The welder unit and stabilizer are mounted on a frame which attaches either to the McCormick-Deering 10/20 or to Fordson tractors. This mounting provides a four-wheel, rubber tired, self-pro-



Pontiac Tractor Co., Lincoln Electric welding equipment mounting

pelled unit. Power for the welder is taken from the tractor power takeoff pulley.

Norton Grinding Machines

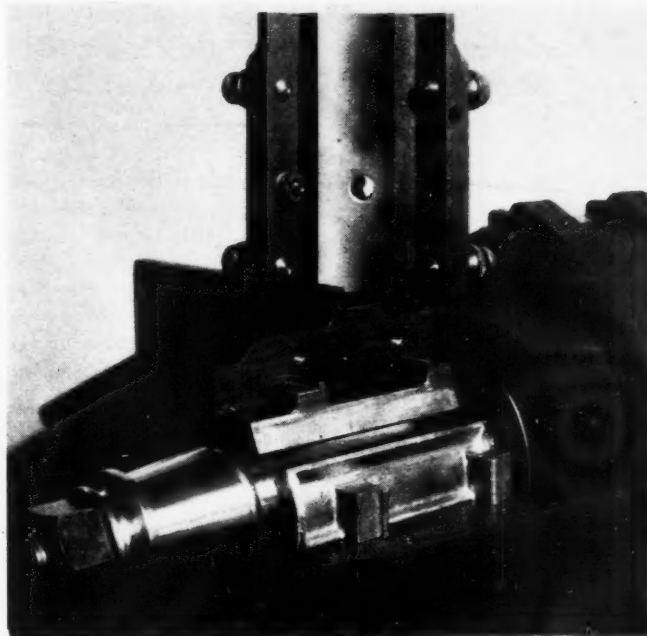
THE Norton Co., Worcester, Mass., has brought out a line of larger Type BA cylindrical grinding machines which swing work up to 14 in. diameter. Ample space is provided for work with flanges up to the capacity of the machine and when steady rests are needed pieces as large as 6½ in. diameter can be ground. Standard sizes are from 14 by 36 in. to 14 by 120 in.

All the features of the 10 in. machines have been incorporated including an improved wheel spindle, ball bearing wheel feed screw, chain drive headstock, selective gear speed change mechanism and antifriction countershaft bearings on the overhead drive arrangements. The new

machines are supplied with either overhead or motor drive and with either power or hand table traverse.

The wheel spindle bearings permit adjustment while the machine is in operation. The lower one is fixed while the upper and outer are adjustable by means of thumb screws. Flood lubrication, visible through glasses on the wheel slide, insure ample oil for the spindle.

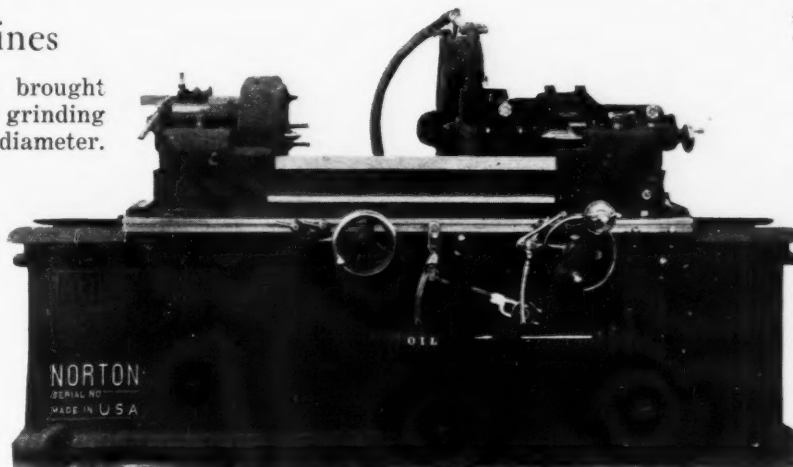
A convenient speed changing mechanism is provided. An independent truing device permits truing the wheel



Detail of wheel spindle bearing showing adjustable bearings

without disturbing the level for regular table speed changes. The headstock may be belt or motor driven. Screw or lever type footstocks are supplied regularly but air or crank operated styles are available.

The work table is characteristic of the Type A Norton machine and any of the attachments or mechanisms for the 14-in. Type A equipment may be used on the new model.



Norton Type BA, 14-in. swing grinder

Death of Col. Clifton Ends Long Service to Industry

Was pioneer motor car manufacturer and recognized leader in organization work. Honored by N.A.C.C. after serving as its president for 14 years.



Col. Charles Clifton

THE automotive industry lost one of its outstanding pioneers in the death last week of Col. Charles Clifton, chairman of the board of the Pierce-Arrow Motor Car Co., and honorary president and director of the National Automobile Chamber of Commerce. His death occurred at his home in Buffalo, N. Y., on Thursday night, June 21, following an illness of a week. He was in his 79th year.

Colonel Clifton occupied a unique position in the industry. In the realm of association work he stood out not only as one of the pioneers but as a man who for 25 years was an active exponent of organized endeavor. He was active president of the National Automobile Chamber of Commerce from its inception in 1913 to 1927. Previous to that he had reigned as head of the Association of Licensed Automobile Manufacturers for six of its seven years' life, and as president of the Automobile Board of Trade during its brief existence.

Started as Hardware Clerk

Buffalo, where he resided all his life, was his birthplace. His father was a hotel proprietor. He was educated in the Buffalo public schools and Highland Military Academy, Worcester, Mass. At the age of 18 he commenced his business career as a clerk with Sidney Shepard & Co., a Buffalo hardware concern.

He was connected with various other enterprises until he joined the George N. Pierce Co. as secretary-treasurer in 1897. This company later became the Pierce-Arrow Motor Car Co and Clifton's affiliation continued up to the time of his demise. He became treasurer when a reorganization was effected in 1909 and president with the 1916 reorganization. The latter office he held until July, 1919, when he became chairman of the board, a post he filled until the end.

But during this period of his life it was not only the Pierce-Arrow company that recognized and rewarded his executive ability. Pierce became a member of the Association of Licensed Automobile Manufacturers, organized in 1903 to operate under the Selden patent, and Clifton's association work commenced. He became intensely interested in association affairs and in 1904 assumed the helm of the A.L.A.M. He steered capably through the stormy days of the Selden patent litigation but there was no avoiding the wreck that came when the United States Circuit Court of Appeals declared the Selden patent

uninfringed by Ford. Out of this was born the short-lived Automobile Board of Trade, which likewise honored Col. Clifton with the presidency.

The National Association of Automobile Manufacturers, the pioneer organization formed in 1900, had, by some inexplicable miracle—considering the interlocking memberships—remained neutral in the disputes of the A.L.A.M. and its rival, American Motor Car Manufacturers Association. This latter group disbanded when the U. S. Circuit Court of New York declared the Selden patent valid in 1909. The A.L.A.M., as related above, received its death blow when Ford's appeal to the supreme tribunal was sustained. There remained then, in 1913, two organizations with similar aims—the N.A.A.M and the A.B.T. Memberships and directorates were interlocking and leaders in both associations finally effected a fusion that took the name of National Automobile Chamber of Commerce and the person of Col. Charles Clifton as president.

In the succeeding years the N.A.C.C. directors annually paid Col. Clifton the tribute of confidence and appreciation by reelecting him to the presidency, and when he asked to be allowed to retire in 1927, they made him honorary president and director.

In addition to the offices already mentioned, Colonel Clifton was a director of the Marine Trust Co. of Buffalo, president and trustee of the Buffalo General Hospital, president and director of the Buffalo Fine Arts Academy, member of the Buffalo Club, Buffalo Country Club, Saturn Club, Detroit Athletic Club and Engineers Club of New York. During the World War he was president of the Allied War Relief of Buffalo and president of the Fatherless Children of France, also of Buffalo. For his war work France made him a Chevalier of the Legion of Honor. He was married to Miss Grace Gorham, of Buffalo, on January 22, 1891, and had two children, Gorham Clifton and Alice Clifton. All survive him.

Just Among Ourselves

Many Mergers Looming Among Supply Companies

THE whirl of mergers continues as the weeks go by. The Studebaker-Pierce-Arrow negotiations appear to be nearing a conclusion as we write and literally scores of parts and accessory company combinations have been consummated in the last month or so. The amalgamations in this latter group have been fairly numerous for the last year or two, as a matter of fact, and give food for some interesting analyses which we hope to get into before many weeks. Generally speaking, the possibilities in supply company mergers divide themselves into two broad classifications—mergers of companies making a similar product on the one hand and mergers of companies making non-competitive lines on the other.

* * *

Attitude of Customers an Important Factor

THE advantages of the two types of combination would seem to be quite distinct. In the first instance, there is to be gained primarily the same sort of economies in reduction of overhead and savings through large purchasing that tend to accrue to the vehicle group mergers. In the latter instance, on the other hand, the prime gain would seem to be an increased stability in dollar income and a lessening of the effects of permanent contraction in some lines and seasonal fluctuations in the sale of all lines. The opinion of the car and truck manufacturers, moreover, is likely to have some effect on the type of merger finally worked out in the case of some supply interests, because these vehicle makers are, in

many instances, the chief customers of the companies involved. There would seem to be sound economic reasons for consolidations of both kinds in the parts field at the moment, however, whether the matter be viewed from the standpoint of the companies involved in the mergers or from the viewpoint of those vehicle manufacturers who will be the chief customers.

* * *

Service Experiences No. 2

(From C. E. Packer)

The radiator had been leaking. Finally the car owner, having more time than money, removed the radiator and took it to a shop for repair. The leak was small and very accessible. With a dash of acid and the application of a soldering iron the trouble was cured. "How much?" said the customer figuring a 50-cent piece. "\$3.50," was the startling reply. "How come?" said the customer. "Price quoted by Flat Rate for fixing radiator," was the dumb explanation. All of which strengthens our conviction that no matter what the factory service department may do there never will be a substitute for brains.

* * *

The Weather as a Sales Barometer

THE weather always is prominent in the prognostications and resumes of automobile sales activities which make their appearance from time to time. Despite closed cars, snow clearance activities and winter business drives, the automobile business continues to be a seasonal one for a great majority of the wholesalers and retailers. That condition probably always

will exist to a material extent, but its effects are far from being minimized to the extent that they might be. One distributor was talking to the president of the company manufacturing the car which he handled the other day and the factory man had been outlining plans by which, he claimed, the distributor could make \$65,000 the first half of this year. "That's easy," the distributor replied. "I know how to make \$65,000 the first six months of this year or any other year; I've often done it. What I want you to figure out is some way that I can keep that \$65,000 clear through the last six months."

* * *

It Makes a Good Alibi, at Any Rate

WE have always contended, nevertheless, that the weather got blamed for a lot more unfavorable sales situations than it should; it is an alibi just about as often as it is an economic force. This year, for example, retail sales for most companies have been exceeding those of the first half of 1927, sometimes by a considerable margin. Yet one official assures us, "during the month of June no area has reported normal weather conditions. Practically all the states east of the Rocky Mountains have had too much rain." If sales had been behind it is our guess that the weather would have featured as the arch villain in the plot. Well, anyway, clear and normal summer weather is being promised by the meteorological powers that be from now on, so if sales during the next few months aren't up to expectations the blame will have to be placed on some other factor—perhaps the presidential election.—N.G.S.

U. S. Exports of Cars, Trucks, Tires and Parts

COUNTRIES	PASSENGER CARS						TRUCKS						ELECTRIC		PARTS
	Up to \$1,000		\$1,000 to \$2,000		Over \$2,000		Up to 1 Ton		1 to 2½ Tons		Over 2½ Tons		No.	Value	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value			
Austria.....	6	\$4,196	2	\$2,304											\$23,243
Azores and Madeira Islands.....	6	2,759			1	\$2,054									990
Belgium.....	1,310	843,557	480	544,882	42	93,081	152	\$70,121	15	\$9,305	2	\$1,368			237,744
Bulgaria.....	27	14,038	8	8,888			37	15,917							1,246
Czechoslovakia.....	69	45,264	18	21,487	2	4,138	14	9,314	3	3,969					9,677
Denmark and Faroe Islands.....	1,153	598,663	117	131,949	10	24,887	360	174,358	48	28,568		6,551			69,540
Estonia.....	3	2,278	3	3,939					8	11,528					62
Finland.....	248	172,367	229	262,152	57	122,221	33	30,028	38	38,510					19,376
France.....	68	38,506	97	115,213	19	47,845	43	18,468							92,631
Germany.....	533	289,039	130	146,615	99	220,774	76	34,048	76	35,664			1	\$2,469	1,163,761
Gibraltar.....	5	3,010													
Greece.....	122	62,257	18	21,322	5	11,694	66	36,974	3	5,280					10,423
Hungary.....	34	22,489	26	28,657	2	4,712	3	3,096							4,771
Iceland.....	11	6,153	3	3,597			4	850							4,069
Italy.....	65	44,594	68	80,052	13	29,194	8	4,305	1	405					20,819
Latvia.....	4	2,584					7	6,507							1,868
Lithuania.....	7	3,418													166
Malta, Gozo and Cyprus Islands.....	15	10,390	18	19,961											370
Netherlands.....	301	152,233	76	92,122	16	36,801	3	4,200	21	11,805					50,312
Norway.....	144	95,250	45	54,232	2	4,068	18	18,756	43	60,008	6	21,430			21,359
Poland and Dantzic.....	91	45,983	21	21,983	2	4,104	2	1,497	7	6,430	3	10,200			109,565
Portugal.....	36	12,226	10	11,855	4	11,010	5	4,233	2	3,074					1,996
Rumania.....	190	111,347	87	93,349	21	48,875	122	66,884	13	12,593					12,788
Russia.....	12	6,176			2	5,741			2	2,863	18	92,679			3,139
Spain.....	699	460,915	197	238,758	70	155,969	355	158,485	71	77,761					58,348
Sweden.....	718	446,447	517	551,341	47	108,377	486	256,502	45	43,603	12	20,050			87,096
Switzerland.....	285	185,717	145	182,058	12	25,420									7,799
Turkey.....															
United Kingdom.....	1,739	852,688	40	51,055	47	116,205	609	372,105	246	128,824	10	26,666	2	2,515	297,388
Irish Free State.....	17	7,460	4	3,680			5	2,801	19	7,985					28,645
Yugoslavia.....	40	21,762	8	9,398	15	40,634	7	3,364							599
United States.....															
British Honduras.....	6	2,090					1	426							872
Canada.....	4,600	2,756,682	1,126	1,394,487	177	460,461	198	145,417	407	578,275	103	199,556	6	4,622	5,818,012
Costa Rica.....	19	14,695	10	11,367	1	2,036	2	1,847	5	5,057					6,551
Guatemala.....	10	5,211	18	20,824	19	38,530	11	8,554	15	22,109					12,493
Honduras.....	11	5,488					5	2,116							2,965
Nicaragua.....	2	1,043	7	8,359											3,049
Panama.....	45	27,104	22	22,892	6	13,777	12	11,049	10	18,097					13,369
Salvador.....	10	7,105	9	9,501	4	8,750			1	3,596					4,630
Mexico.....	1,009	486,651	127	152,502	20	57,973	210	94,689	53	65,441	8	14,085			138,025
Miquelon.....															
Newfoundland.....	29	19,320	8	10,013			2	845							2,435
Barbados.....	5	4,036	1	1,444											2,613
Jamaica.....	32	21,367	13	15,636			6	5,526	2	2,875					19,767
Trinidad and Tobago.....	4	3,054					1	739	5	6,219	1	2,883			2,857
Other British West Indies.....	16	5,846					1	921	3	4,300					2,869
Cuba.....	465	310,631	58	75,525	7	21,437	21	8,125	11	31,593	3	8,675			90,931
Dominican Republic.....	64	41,082	21	21,050	4	9,869	3	1,795	5	4,991					9,578
Dutch West Indies.....	4	2,162	5	6,842			5	3,937	5	3,196	4	11,615			4,389
French West Indies.....	8	4,034					2	1,183	1	480					984
Haiti.....	14	8,714	4	3,727			8	3,751			2	9,000			4,891
Virgin Islands.....	5	2,514							1	350					849
Argentina.....	2,524	1,306,995	337	395,492	97	243,373	155	72,622	219	169,467	76	142,431			373,410
Bolivia.....			1	1,000	3	6,685	6	5,526	2	7,131					2,229
Brazil.....	1,385	626,353	229	265,013	40	103,152	793	360,954	198	129,798	3	5,072			280,911
Chile.....	181	106,150	68	76,106	15	35,775	21	12,538	86	131,673	2	7,338			62,915
Colombia.....	83	60,944	67	82,428	22	55,037	30	23,657	26	51,269	5	19,126			65,238
Ecuador.....	9	7,251	5	7,209	2	5,788			4	6,031					3,002
Falkland Islands.....															
British Guiana.....	2	1,564													1,958
French Guiana.....															130
Dutch Guiana.....			2	2,439					1	480					289
Paraguay.....	4	3,042	2	2,064											818
Peru.....	29	18,617	19	23,414	2	3,869	11	8,023	21	16,125					34,755
Uruguay.....	462	242,933	68	83,276	18	35,597	94	45,355	7	15,819	4	13,201			45,606
Venezuela.....	43	28,339	63	81,586	4	10,066	13	9,909	15	31,350	1	2,697			28,996
Aden.....	8	5,461	1	987											996
British India.....	306	209,085	119	123,065	1	2,292	295	203,420	27	32,890					159,510
Ceylon.....	55	38,988	27	28,729	2	6,158	3	2,766	10	12,643	12	16,950			15,011
Straits Settlements.....	14	9,307	9	11,407											57,090
China.....	52	32,677	7	9,995			45	34,050	4	2,281	1	6,120			64,373
Java and Madura.....	746	407,823	193	196,534	21	43,506	537	248,633	14	19,247	1	3,571			68,312
Other Dutch East Indies.....	47	29,373	13	16,360	1	2,106	7	5,597							21,992
French Indo-China.....	7	2,870													21
Hejaz, Arabia and Iraq.....	5	3,326					14	7,108	3	4,260					1,649
Hongkong.....	17	11,074	2	2,610					1	350					2,515
Japan.....	703	406,949	81	103,074	23	64,935	56	38,313	66	92,925	57	66,903			761,666
Kwantung.....	3	2,332	2	2,001											2,482
Palestine and Syria.....	74	52,067	17	19,619			12	11,090	9	10,358					10,057
Persia.....	30	19,839					1	830	3	2,924	1	7,868			6,532
Philippine Islands.....	120	79,335	30	38,544	10	25,552	46	26,656	15	18,737	1	5,500			26,698
Russia.....															
Siam.....	10	6,811													2,341
Turkey.....	43	23,870	19	24,307	15	42,829	26	8,650	1	350					11,134
Other Asia.....	1	880													

for April, 1928

Canadian Exports

TIRES						PASSENGER CARS						TRUCKS		PARTS	COUNTRIES
Casings		Inners		Solids		Up to \$500		\$500 to \$1,000		Over \$1,000		No.	Value	Value	
No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value				
2,770	\$54,301	2,659	\$8,260	13	\$608									\$983	Austria
1,339	26,952	837	2,318												Azores and Madeira Islands
2,451	37,326	1,247	2,823	22	682										Belgium
254	2,836	235	424	2	91										Bulgaria
1,681	28,289	1,311	2,836	20	1,796										Czechoslovakia
10,604	138,172	4,210	11,584	1	54	10	\$4,605							227	Denmark and Faroe Islands
20	232	20	36												Estonia
5,523	88,091	3,499	8,672												Finland
684	9,534	228	680	12	620										France
15,696	199,989	5,721	13,701	4	98			6	\$4,811	2	\$2,568			741	Germany
															Gibraltar
1,291	18,822	804	1,659												Greece
794	11,444	489	1,613												Hungary
82	956	74	88												Iceland
841	11,752	42	196	4	201							5	7,501		Italy
74	1,588	54	94												Latvia
60	790	48	120												Lithuania
						11	4,514	5	2,852			10	\$3,415		Malta, Gozo and Cyprus Is.
4,707	81,145	2,234	5,300					6	5,268						Netherlands
1,993	32,575	1,798	3,382	26	1,539	17	7,291	10	9,121	4	4,356				Norway
2,287	34,748	1,463	3,431							1	1,546				Poland and Danzig
512	9,071	545	1,347												Portugal
5,308	59,669	4,130	5,543			4	1,544			5	6,089				Rumania
										1	1,227			58	Russia
5,808	92,470	3,036	6,961	21	505										Spain
16,595	194,226	12,043	22,494												Sweden
2,610	37,646	1,502	4,192			19	8,916	3	2,841	4	4,484			34	Switzerland
						7	2,702			1	1,496	10	3,579		Turkey
7,189	73,603	5,405	7,577	74	1,224	145	23,713	354	224,312	98	128,858			1,044	United Kingdom
691	5,664	584	932												Irish Free State
217	2,119	387	693	4	128	10	3,860			1	1,537	6	2,007		Yugoslavia
						7	1,750	3	2,410					5,027	United States
38	281	76	115			1	375								British Honduras
1,988	17,373	5,476	8,585	79	2,081										Canada
1,601	13,472	677	2,235	74	1,988	4	1,661			1	1,414	4	1,432		Costa Rica
466	8,142	355	925							1	1,232				Guatemala
192	3,020	197	366	16	978										Honduras
78	1,426	83	212			2	749			1	1,166			8	Nicaragua
1,056	11,069	1,185	1,967	49	1,599	2	771	2	1,066			94	36,424		Panama
411	6,552	404	889												Salvador
8,083	73,847	3,291	6,389	328	5,239										Mexico
30	290	30	43			1	420								Miquelon
145	1,347	292	457			1	420							242	Newfoundland
18	159			18	488	7	2,744	1	571					57	Barbados
295	5,285	146	421	39	771	19	7,116	10	7,546	1	1,101	6	2,148		Jamaica
93	1,802	36	124			18	7,441	7	3,801	1	1,069	8	2,835	43	Trinidad and Tobago
43	346			4	72	1	382	1	511	5	1,805				Other British West Indies
7,800	74,873	8,921	17,667	527	15,833			5	5,713			5	5,713		Cuba
274	4,993	277	655	72	1,380									192	Dominican Republic
647	9,470	891	2,097			10	3,786			1	1,147			59	Dutch West Indies
66	474	22	30	8	436	11	4,120			1	1,202				French West Indies
475	8,485	432	1,040	2	37	9	3,252								Haiti
11	113	33	62	11	450										Virgin Islands
15,556	173,863	8,765	17,552	244	20,809	96	35,636	6	5,734	24	28,623			2,879	Argentina
45	875	39	107	2	73			2	1,014						Bolivia
11,292	106,613	2,868	3,334	146	4,468	26	9,620	13	11,662	5	5,344			543	Brazil
1,750	29,804	1,816	4,314	77	3,205	81	31,441	8	4,179			82	32,844		Chile
4,719	87,191	4,430	11,928	126	6,576	23	8,997	9	5,671	2	3,085	30	11,336	72	Colombia
146	2,232	188	386					1	503						Ecuador
				65	2,117										Falkland Islands
						6	2,265	3	1,933	1	1,243				British Guiana
															French Guiana
															Dutch Guiana
6	84	30	39			2	760								Paraguay
						6	2,358	2	1,759	4	5,156	20	7,159		Peru
886	13,941	628	1,670	41	1,850	26	10,873	11	6,795	1	1,121	6	2,248		Uruguay
5,105	68,828	2,608	5,484	9	582	30	11,100	5	4,284	2	2,285			836	Venezuela
1,293	21,833	1,185	3,544			49	18,372			3	3,440	11	3,908		Aden
2,718	41,809	236	585	240	8,036	319	121,600	51	39,201	9	11,370	492	174,056	10,518	British India
463	6,319	392	1,020	14	329	12	4,835	14	9,383	4	4,163	14	4,493	466	Ceylon
13,973	118,555	339	1,641	19	346	62	23,862	16	9,825	2	2,242	20	8,359	8,119	Straits Settlements
2,020	24,283	1,361	2,505	60	1,248	14	5,942								China
5,786	64,068	1,412	4,933	36	1,110										Java and Madura
250	3,392	47	66			13	4,800			20	24,490	3	931	8,293	Other Dutch East Indies
275	2,607														French Indo-China
277	2,687	165	271												Hejaz, Arabia and Iraq
122	995	43	86			1	388	1	510						Hongkong
8,496	74,239	5,345	8,979	241	5,863					2	2,125			14	Japan
															Kwantung
781	11,188	357	501			16	6,174			1	1,148	4	1,432		Palestine and Syria
156	3,365	210	707									16	5,925		Persia
6,717	85,897	5,268	10,942	170	4,851										Philippine Islands
															Russia
						1	420					4	1,731	1,724	Siam
144	1,226														Turkey
															Other Asia
2,433	48,893	150	290	518	25,703	167	51,237	5	3,855	1	1,398	6	1,756	21,322	Australia
972	12,351	590	1,612	90	3,952	146	63,932	102	66,947	20	23,928	2	576	24,259	New Zealand
55	514	85	151			1	420							33	British Oceania
41	821	38	141												French Oceania
						3	1,193	4	3,014					631	Other Oceania
						13	4,941					10	3,684		Belgian Congo
130	3,799	132	543			29	11,215	1	883	1	1,144	63	21,135	1,312	British West Africa
1,939	26,586	1,368	2,982	18	849	27	11,361	18	11,227	3	3,268			6,186	British South Africa
1,068	13,219	712	1,450			40	16,262	32	18,660			14	4,913	815	British East Africa
516	8,267	340	768	26	1,867	9	3,372								Canary Islands
2,133	36,079	2,182	4,518	66	2,614	63	24,512			1	1,537</				

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania June 30, 1928

Factory Output Continues at Record Seasonal Level

PHILADELPHIA, June 30—Continued large output by many of the factories in the smaller production group is maintaining a very favorable rate of operation in the automotive industry. The activities of these factories, plus the increasing operation by Ford Motor Co. and the high seasonal level for some other large producers, promises to bring the June output to within striking distance of the record 1928 output in May.

Retail sales are continuing at a rate that is extremely satisfactory and there are possibilities that the total cars turned over to buyers in June will equal if not exceed any month of the year. In many parts of the country deliveries of some makes are 10 to 20 days behind orders. Orders for new Fords continue to remain far ahead of actual delivery dates throughout the country. The used car situation has shown considerable improvement with the increase in buying for summer touring.

A review of automotive business in the first half of the year reflects generally prosperous conditions throughout the country. Sales have been on a high level in practically all sections and cars in all price classes have shown gains consistent with a generally better economic condition. Throughout the half-year price apparently has had a relatively unimportant part in determining purchases, the decision to buy resting mainly upon the style appeal of the individual vehicle.

First Quarter Exports Increase 18% Over 1927

WASHINGTON, June 28—Exports of automobiles, parts and accessories, showed a gain during the first quarter of 1928 of 18 per cent in comparison with the first quarter of 1927, breaking all previous records, the Chamber of Commerce of the United States has announced in a statement analyzing the world trade situation.

Foreign shipments of passenger cars, according to the U. S. Chamber figures, during January, February and March, 1928, totaled 85,771 and of motor trucks and buses, 30,215. Exports of automobile engines nearly doubled, compared with the first three months of 1927, 47,583 being shipped in that period of 1928 as against 25,113 for the corresponding period of 1927.

Automotive exports, the chamber states, enjoyed the largest share of exports in the history of the industry. Gasoline, however, including naphtha and other by-products, although the quantity shipped increased more than 35,000,000 gal., declined in value as an export from 14 to 10 cents a gallon, and sustained the severest export loss.

P.-A. Directors Act on Studebaker Deal

CHICAGO, June 27—Belief that a definite offer to purchase the Pierce-Arrow Motor Car Co. has been decided upon by the Studebaker Corp. of America was given force in South Bend yesterday when A. R. Erskine, president of Studebaker, left a meeting of the board of directors to say: "Any statements that will be made will come from the Pierce-Arrow Motor Car Co. after the meeting of that company's directors in Buffalo, Friday."

Financial interests here took this statement to indicate that Studebaker, in placing the burden of definite announcement upon Pierce-Arrow, had made, or would make Friday, a concrete offer for the Pierce-Arrow property. Terms of the deal are understood to include the purchase by Studebaker of a \$3,000,000 interest for cash and an exchange of new Class A stock on the basis of one share for each eight-tenths share of Pierce-Arrow preferred. New Class B stock is expected to be exchanged at \$25 a share on the basis of one share for each two shares of Pierce-Arrow common.

Franklin to Introduce Special Body Features

SYRACUSE, June 30—A line of cars possessing appointments usually associated with specially built cars only, will be offered in a standard line by the Franklin Automobile Co. within a week, according to a statement by H. H. Franklin, president. Mr. Franklin declared that the interiors will be of a quality and craftsmanship found heretofore only in the highest-priced built-to-order cars.

AC Builds New Air Cleaner

FLINT, June 27—AC Spark Plug Co. is now building an oil wetted louvre type air cleaner which, according to the company announcement, gives 100 per cent air cleaning at all engine speeds, muffles carburetor noises and reduces the fire hazard from backfiring.

Chevrolet Schedules 100,000 Cars a Month

DETROIT, June 27—Chevrolet Motor Co. has a minimum production schedule of 100,000 cars during June, July and August, according to C. F. Barth, vice-president in charge of manufacturing. Mr. Barth said the easing of buying which ordinarily comes at this time of the year has failed to materialize and because of excellent outlook, the company has decided to maintain heavy production.

Mass Transportation Need Met by New Bus Design

CINCINNATI, June 27—The claim no longer can be sustained that fixed rail cars are more efficient in handling mass transportation than the motor coach because of the recent development of buses of increased carrying capacity, according to F. R. Fageol, president of the Twin Coach Corp., speaking before the second annual convention of the bus division of the American Automobile Association. Ultimately the bus will replace the street car in urban and suburban service and also in the interurban field, perhaps up to distances of 200 to 300 miles, Mr. Fageol said.

Other features of the day's program were the reelection of A. M. Hill and G. P. McCallum as chairman and vice-chairman of the division and the report of the legislative committee. S. A. Markel, chairman of the committee, referred particularly to activity on Federal legislation and the committee's work was endorsed by the convention. The National Automobile Chamber of Commerce was arraigned during the discussion for opposition to the Parker bill. E. F. Loomis, for the N.A.C.C., said it favored Federal legislation but would continue to oppose restrictive legislation of the type embodied in the Parker bill.

The uniform bus specifications code was considered and referred to the division's equipment committee.

Adds Clutch Manufacture

CHATHAM, ONT., June 26—Hayes Wheels & Forgings, Ltd., is further diversifying its output by entering upon the manufacture of clutches for motor cars. The company's principal products are automobile wheels and front and rear axles.

Dodge-Chrysler Deal Brings 70% Response

Decision to Extend Stock Filing Date Waits—Court Rules on Injunction

NEW YORK, June 27—Approximately 70 per cent of preferred and Class A common stock in Dodge Brothers, Inc., was deposited by June 26 in accordance with the plan for the merger of this company with the Chrysler Corp. Inasmuch as this falls somewhat short of the original plan, some question has arisen as to whether the date for filing deposit will be extended but no announcement has yet been made on this by any of the parties concerned.

Compilations are not yet complete but it is estimated that 73 per cent of the preference shares and 69 per cent of the Class A common shares have been deposited at various points throughout the country. The committee in charge of the plan feels that this was a very good response, considering the time elapsed since the method of transfer was announced.

Dispute Court Jurisdiction

One holder of preferred stock made a last-minute attempt to block the whole procedure by securing an injunction against the exchange of 7 per cent preferred stock redeemable at \$105 for 3 per cent common stock having a market value of approximately \$69. A temporary injunction was granted but hearing on the granting of a permanent injunction developed a question as to whether New York courts had jurisdiction. The Dodge Brothers company is a Maryland corporation and the Maryland laws specifically allow for the merging of companies by the transfer of stocks on the approval of the voting stock. Class B common is the only stock of Dodge Brothers carrying a vote and as that is all held by Dillon, Read & Co. the action has already been approved.

The contesting stockholder, however, maintained that the merger amounted virtually to a dissolution of the Dodge Brothers company and that under the terms of issue of the preferred stock he was guaranteed \$105 a share for each share of stock held on dissolution or liquidation of the company. According to his contention, therefore, the announced exchange policy would defraud him of something like \$35 a share in addition to giving him an inferior security, from point of view of preference and rate of return.

The court held that the stockholder was within his rights in instituting the action at this time. The entire matter was taken under advisement.

U.S. Offers Latex Tube

NEW YORK, June 28—An inner tube of special resiliency and durability, processed from natural rubber latex, is announced this week as a new develop-

ment of the United States Rubber Co. The manufacture of the tube from latex is said to involve an intricate technical process, differing in every way from former methods. The tube is formed in circular shape and the claim is made that it will outlast any casing. It will be marketed under the trade name of Ustex and will be available at first in 30 by 4.50 and 29 by 5.00 sizes.

Higher Engine Speeds Predicted by Litle

QUEBEC, June 27—Higher engine speeds in stock car powerplants were predicted today by T. J. Litle, Jr., chief engineer of Marmon Motor Car Co., at the second day's session of the Society of Automotive Engineers' summer meeting. Debate regarding the individual springing of wheels and discussion of engineering phases of state brake legislation were other important topics which held the attention of the technical men in the opening days of the meeting. More than 800 members and guests are attending.

W. R. Strickland was nominated to be president of the society for the year 1929, and E. P. Warner was nominated to be first vice-president.

Major E. G. E. Beaumont, president of the British Institute of Automobile Engineers, outlined British automotive progress in a brief talk on the evening of the opening day. Major Beaumont was elected to honorary membership in the society.

Engineers were urged to refrain from engaging in the game of "buck passing" by Norman G. Shidle, who talked on "The Engineer as a Business Man."

The sports program was seriously hampered by severe rain on the first two days of the meeting.

Forms De Soto of Canada

WINDSOR, June 26—Organization of the De Soto Motor Corp., Ltd., of Canada, was announced this week by John Mansfield, president and general manager of Chrysler Corp. of Canada, Ltd. The new company, a division of the Chrysler Corporation, will manufacture the De Soto six. The new car will be mainly a Canadian product. As far as possible all parts and materials will be produced in Canada, and the car will be manufactured in the Chrysler plant at Windsor.

Moon Makes Appointments

ST. LOUIS, June 27—The following territorial assignments have been made by Moon Motor Car Co.: Helm Walker, Chicago district; E. M. Todd, Cleveland; A. H. McIntyre, New England; A. E. Ericksen, New York; V. K. Gaston, St. Louis; C. L. Zeller, Kansas City; P. C. White, Northwest; David McCosker, Los Angeles; G. F. Reed, Pittsburgh; J. H. DeJong, Canada. J. M. Robbins, assistant to R. A. Rawson, general sales manager, will function as a general traveling representative.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co.

NEW YORK, June 28—In addition to the seasonal dullness that usually appears at this time of year and the increased caution that may have been due to the political conventions, excessive rainfall in many parts of the country has continued to restrict trade activity. While the rains have been beneficial to agriculture in some sections, they have probably done more harm than good in the South, where destruction by the boll-weevil is minimized by hot, dry weather.

FREIGHT CAR LOADINGS

The improvement in railway traffic reported a week ago proved to be only temporary. In the week ended June 9, 995,960 cars were loaded with revenue freight, as against 934,214 cars in the preceding week (a holiday week) and 1,028,367 cars in the corresponding period last year.

BANK DEBITS

On the other hand, bank debits to individual accounts outside of New York City continue to compare favorably with those a year ago. Debits in the week ended June 26 were 18 per cent larger than a year earlier, and the total for the year to date is 9 per cent above that for the similar period in 1927.

FISHER'S INDEX

Commodity prices in general continue to follow an even course. Professor Fisher's index stands at 97.9 per cent of the 1926 average, as against 97.8 a week ago and 98.8 four weeks ago. The monthly index of wholesale prices compiled by the Bureau of Labor Statistics advanced from 97.4 in April to 98.6 in May.

FEDERAL RESERVE REPORT

In financial markets, the most striking development of the week was the further sharp decline in brokers' borrowings in New York City. The total reported to the Federal Reserve Board on June 20 was only \$4,270,000,000, which compares with \$4,563,000,000 a fortnight earlier.

The same tendency is reflected in a decrease of \$93,000,000 in loans of reporting member banks of the Federal Reserve system during the same period. The week was, in fact, one of general credit contraction. Both demand and time deposits declined, the former by \$385,000,000. Even the discounts of the Federal Reserve banks, which had increased steadily for 13 weeks, dropped from \$1,043,000,000 to \$991,000,000, and the reserve ratio advanced from 67.6 to 69 per cent.

PETROLEUM OUTPUT

Crude oil production declined slightly in the week ended June 16, average daily output for that period being 2,358,450 bbl., as compared with 2,363,800 bbl. in the preceding week and 2,509,650 bbl. in the corresponding period last year. No general change in crude oil or gasoline prices was reported last week.

Production in May Highest Since 1926

Total of 459,932 for United States and Canada is Second Highest Mark

WASHINGTON, June 23—May production of cars and trucks in the United States and Canada was 459,932, according to Department of Commerce figures released this week. The total is the second largest month in the industry's history, the highest month having been April, 1926, with 462,808 production. In October, 1925, when Ford introduced the final revision of the Model T, production totaled 454,030, the third highest month on record.

For the first five months this year the production total for the two countries is 1,901,687, an increase of 47,147 over 1927, but a decrease from the 2,044,346 figure set up in the same period of 1926. The totals by month for the first five months in 1926 were 318,164, 376,209, 448,338, 462,808 and 445,912 respectively. These figures exceed each of the respective months this year except May, the biggest disparity being in January.

The record-breaking total in May was reached mainly because of largely increased passenger car and truck production in Canadian plants. Passenger car and truck production in United States plants also was higher, increases in all cases being scored over the previous month and the same month last year. United States car and truck production in May was 375,798 and 50,192 respectively against 364,877 and 45,312 in April and against 357,150 and 46,965 in May, 1927. Canadian car and truck production in May was 29,764 and 4178 respectively, against 20,546 and 3694 in April and against 21,991 and 3717 in May, last year.

The Canadian five months total of cars and trucks is 96,627 against 106,973 in 1927. United States car and truck production for the five months is 1,805,060 against 1,747,007 in 1927. Canadian car production for the year to date is 82,562 against 88,541 last year; truck production compares 14,065 against 18,432. United States car production for the year to date is 1,609,223 against 1,523,891; truck production is 195,837 against 223,116.

Brown Instrument Builds

PHILADELPHIA, June 25—Brown Instrument Co., maker of industrial and power plant indicating, recording and automatic control instruments, is building another addition to its plant. Construction will be strictly fireproof throughout. The rapid growth of the company and the enlargement of its line have made necessary this latest plant addition, the third within eight years. Its primary purpose is to provide research facilities commensurate with the needs imposed by the rapid expansion of the company's interests.

Five Months' Output Increased to 1,901,687

1928			
	Cars	Trucks	Total
Jan. ...	212,281	27,875	240,156
Feb. ...	301,466	34,847	336,313
Mar. ...	387,053	43,804	430,857
Apr. ...	385,423	49,006	434,429
May ...	405,562	54,370	459,932
Total	1,691,785	209,902	1,901,687

1927			
	Cars	Trucks	Total
Jan. ...	211,395	42,907	254,302
Feb. ...	278,997	44,421	323,418
Mar. ...	365,634	52,033	417,667
Apr. ...	377,899	51,449	429,348
May ...	379,139	50,666	429,805
Total	1,613,064	241,476	1,854,540

	Cars	Trucks	Total
June ...	295,198	45,956	341,154
July ...	245,585	33,371	279,456
Aug. ...	284,489	36,819	321,308
Sept. ...	235,121	36,519	271,640
Oct. ...	189,177	38,224	227,401
Nov. ...	114,076	25,743	139,819
Dec. ...	108,356	28,626	136,982
Total	3,085,086	487,234	3,572,300

Standard Fire Engines Sought at Conference

WASHINGTON, June 25—Standardization of fire engines will be undertaken at a conference this week under auspices of the division of simplified practice of the Department of Commerce, it was announced by the department. Representatives of more than 30 manufacturers and officials of the fire chiefs and firemen's associations, and of the National Board of Fire Underwriters and the National Fire Protection Association, are expected to attend.

The comparative small number of fire engines produced, it is pointed out, has led to diversity in types, which the department hopes to check. A committee of manufacturers already has suggested standard capacities of 300, 400, 500, 750 and 1000 gal. for the fire engines to be produced and the list of capacities finally adopted at the conference will be put into effect at a future date to be determined by the conference.

Cunningham Raises Prices

ROCHESTER, N.Y., June 23—Prices on Cunningham cars have been increased as follows: Seven-passenger touring, \$7,000 from \$6,650; four-passenger sport, \$6,500 from \$6,150; four-passenger coupe, \$8,000 from \$7,600, and six-passenger limousine, \$8,500 from \$8,100.

Safe-T-Stat Moves to Toledo

NEW YORK, June 25—The Safe-T-Stat Co. of Brooklyn is moving its headquarters, including the engineering department, to its main plant at Toledo, where it has adequate facilities for carrying on all branches of the work, with the advantage of being closer to various units of the automotive industry.

3rd Quarter Increase Estimated 26 Per Cent

Freight Car Requirements Show Large Production Planned Through Summer

DETROIT, June 23—The automotive industry enters the third quarter with every indication that a large production rate will continue. While summer production is naturally less than that of the spring months, reports from various branches of the industry are to the effect that the summer production will be greatly in excess of that enjoyed during the third quarter of 1927.

Probably one of the best indications of the anticipated production trend is indicated in the freight car estimates which have been furnished the railroads by the traffic departments of the various automobile companies. The figures for the Great Lakes shipping district, which comprises the bulk of the automobile producing factories, anticipate that approximately 26 per cent more freight cars will be required by the industry than were used during the third-quarter of 1928. This does not consider estimates of the Ford Motor Co., which was shut down during the summer last year.

Reports emanating from the sales departments of the various automobile companies indicates that unprecedented demand for automobiles continues from all sections of the country. Business, it seems, is in a very good condition and this in turn is reflecting in increased orders for motor cars.

Mack Adds Four-Tonner With 6-Cylinder Engine

NEW YORK, June 23—Mack Trucks, Inc., has introduced a six-cylinder truck of three to four-ton capacity known as Model BJ. Some of the design features include cast aluminum cylinder heads, invar strutted aluminum pistons and aluminum crankcase; tubular type connecting rods; dual reduction final drive and four-wheel brakes with vacuum booster. The new model is offered in three wheelbases: 168½, 192½ and 218 in. Tread is 71½ in. front and 66 in. rear. Pneumatic high pressure tires, 36 by 8 in., are standard.

Continues 1000 Bodies Daily

PONTIAC, June 23—The local plant of Fisher Body Corp. which reached a peak production of 1000 bodies a day early in June is expected to continue this rate during the next two months, according to Henry P. Blow, manager of the Pontiac unit.

Evans to Make Separators

DETROIT, June 25—Evans Auto Loading Co. has bought 150,000,000 ft. of timber along the Klamath River in California to be used for manufacturing battery separators. A plant will be built at Eureka, Cal.

A.E.A. to Continue Market Development

Department Will be Directed
by Committee Following
Moock Resignation

CHICAGO, June 25—Present activities of the Greater Market Development Department will be continued until the new committee meets in Chicago in the near future, according to a statement issued by directors of the Automotive Equipment Association in which also was announced the resignation of Harry G. Moock as director of Greater Market Development. This is in response to the approval recorded by the convention at Mackinac last week.

Mr. Moock's resignation came as a surprise to most of the members of the association as it was not given to the board until after the regular convention sessions had closed.

In his presentation of the work of the G. M. D. department, Mr. Moock pointed out that the cut in appropriation to approximately \$130,000 a year did not, in his opinion, provide an appropriation sufficient to do an effective job.

It is understood that Mr. Moock is considering the formation of a new company to furnish marketing—merchandising counsel to associations, manufacturers, wholesalers and retailers.

In accepting Mr. Moock's resignation, the board expressed appreciation of the great value of his services to the Automotive Equipment Association.

Following are the manufacturer members of the new Greater Market Development committee of the A. E. A.: N. H. Boynton, National Lamp Works, chairman; M. C. Dewitt, Champion Spark Plug Co.; W. G. Hancock, McCord Radiator Mfg. Co.; G. W. Fleming, Fleming Machine Co.; C. F. Hodgson, Weaver Mfg. Co.; Chas. C. Gates, Gates Rubber Co.

Shop Equipment Sections Planned for 13 Cities

MACKINAC ISLAND, June 23—Shop equipment sections and clinics are planned for 13 cities, the majority of them in connection with the regular 1929 automobile shows. This was decided upon at an informal discussion of the subject participated in by several prominent shop equipment manufacturers who met at the Hotel Grand here this week.

The cities in which the manufacturers hope to conduct working exhibits similar to those in the national and some of the sectional shows in 1928 are as follows: Dallas, Kansas City, St. Louis, Pittsburgh, Philadelphia, Los Angeles, San Francisco, Detroit, Baltimore, Cleveland, Minneapolis, Atlanta, and Montreal. In addition to these there will be the shop equipment exhibits open to the trade only at New York, Chicago and Boston.

Rio and Sao Paulo Joined by Highway

WASHINGTON, June 25—A new 300-mile highway now links Rio de Janeiro and Sao Paulo, two of the most important cities of Brazil, according to an announcement by the Pan American Union. Construction work on parts of the highway has proceeded for a number of years. The road is eight meters broad with maximum grades of 6 per cent; there are 19 reinforced concrete bridges and about 20 miles of the route are of macadam; 70 miles of crushed clay and gravel with macadam silicate is used on other parts of the road. The vast territory thrown open to motor transportation by this road is expected to stimulate automobile sales in that territory.

Graham Says Independents Important in Industry

BUFFALO, June 23—More than 150 Graham-Paige dealers of Buffalo and western New York were addressed at the Hotel Statler this week by Robert C. Graham. The tendency of automobile factories to merge was regarded with little interest by Mr. Graham. "The Grahams are in control of the Graham-Paige factory and we mean to stay just that way," he said. "I believe that the independent company has a place in the industry, and an important place."

Mr. Graham gave a general talk on the future of the Graham-Paige company, telling of its desire to build up and cooperate with a strong dealer organization, and pointing out that the dealer organization has kept pace with the production growth, now totaling 1500 instead of 500 or 600.

John D. Biggers, brother of W. E. Biggers, Buffalo distributor, who has been associated in business with the three Grahams for 14 years, also talked at the luncheon.

Mazda Prices Reduced

NEW YORK, June 26—Prices on Mazda incandescent lamps will undergo further reduction on July 1, according to announcement by General Electric Co. The reductions average 14 per cent and apply to types which represent about 82 per cent of the total consumption of large Mazda lamps.

Seeger Winsboro President

GREENWOOD, S. C., June 25—The Winsboro Mills at Winsboro, which manufacture the cord used in United States tires, are now operating under the direction of the United States Rubber Co. C. B. Seeger, president of the U. S. Rubber, is now president.

Oakland to Build New Foundry Unit

Will Have Capacity for 450
Tons of Castings Daily—
Ready in February

PONTIAC, June 25—The Oakland Motor Car Co. will build a large foundry unit adjoining its new plant. According to President A. R. Glancy the foundry will comprise six buildings and will add more than 200,000 sq. ft. of floor space to the Oakland factory. Ground is being broken this week and the foundry will be ready for operation next February.

Coincident with the foundry announcement Mr. Glancy stated that work will also be started immediately on a new chassis parts plant to be installed in Plant 5 of the old Oakland plant. Machinery from this factory is being moved to the new Oakland plant and as soon as all equipment is removed the structure will be remodeled and equipped as a chassis parts plant.

The foundry will be located just south of the engine plant. The foundry proper will be a one-story structure with high roof equivalent to a two-story building of the ordinary factory type. It will be 260 x 247½ ft.

The core building will be one-story and will cover an area of 160 x 247½ ft. The sand storage will be 80 x 225 ft. rising 50 ft. from its foundation to the bottom level of the roof presses. The cupola building will be three stories, 60 x 100 ft. There will also be a one-story cleaning building 120 x 270 ft. and a two-story service building 60 x 360 ft.

Crude pig iron will come in at the foundry and be unloaded and poured into castings at the rate of 450 tons a day. The castings will move over into the engine plant where the complete engines will be assembled.

Named McFarlan Receiver

INDIANAPOLIS, June 23—R. S. Springer, of Connersville, has been appointed temporary receiver of the McFarlan Motor Corp. Hyatt Frost, an attorney for the company, said its failure was due to the continued illness of Harry McFarlan and to the recent death of Burt Barrows, vice-president. They were the principal owners. The company will complete a \$40,000 contract for bodies within the next 30 days, it was reported.

Dodge Brothers Signs K. C. Dealer

KANSAS CITY, June 25—A new firm known as the Dial-Walsh Motor Co. has been appointed Dodge Brothers dealer for the Kansas City territory. The new company is headed by Glen Dial, formerly with Norval & Dial, Dodge Brothers dealer in Tulsa, Okla., and Edward F. Walsh, Jr., formerly Dodge Brothers dealer in Bartlesville, Okla.

Men of the Industry and What They Are Doing

G.M. Truck Names Five Division Sales Coaches

General Motors Truck Co. announces the appointment of five divisional sales coaches. They follow:

S. P. Landers, Eastern division, covering Baltimore, Boston, Providence, Springfield, Worcester, Buffalo, New York, Newark, Philadelphia, Wilmington, Rochester and Washington, D. C.

L. L. Temper, Central division, comprising Cincinnati, Cleveland, Dayton, Detroit, Grand Rapids, Indianapolis, Fort Wayne, Louisville, Pittsburgh, Pontiac, Saginaw, Toledo, Wheeling.

P. E. O'Connor, Southern division, including Atlanta, Birmingham, Charlotte, Dallas, Houston, Memphis, Nashville, New Orleans, San Antonio and Shreveport.

H. W. Howard, Western division, comprising Chicago, Des Moines, Iron Mountain, Kansas City, Milwaukee, Minneapolis, St. Paul, Omaha, St. Louis and Tulsa.

G. H. Barmore, Coast division, including Denver, El Paso, Los Angeles, Portland (Ore.), Salt Lake City, San Francisco, Oakland, Sacramento, Seattle, Tacoma and Spokane.

Andrews New Jersey Guest

General A. Lincoln Andrews, director general of the Rubber Institute, Inc., was the guest of honor at the annual dinner and meeting of the Rubber Manufacturers' Association of New Jersey, at the Trenton Country Club. The members of the mechanical rubber goods division of America were also guests. A. Boyd Cornell, president of the New Jersey Association, presided, and John A. Lambert, treasurer of the Acme Rubber Co., was chairman of the entertainment committee.

Smith Rejoins Industry

George Smith has returned to the field of electroplating as vice-president of Hanson-Van Winkle-Munning, Matawan, N. J., in charge of activities in the Central and Western States. He formerly was with General Electric Co., A. P. Munning & Co. and Rother Brothers & Co.

Richards Joins Corbitt

William Richards, formerly plant manager of the Interstate Body Co., Paterson, N. J., and of the Westchester Auto Body Co., White Plains, N. Y., is now plant manager and designer for the Corbitt Truck Co., Henderson, N. C.

Bugbee Severs Connection

L. E. Bugbee, formerly vice-president of the Cadillac Machinery Co., Detroit, is severing his connection. Mr. Bugbee has not announced his future plans.

Mosher is Appointed Peerless Sales Head

R. N. Mosher has been named general sales manager of the Peerless Motor Car Corp., Leon R. German, president, announced Thursday. Mr. Mosher succeeds Charles A. Tucker, resigned. Prior to his new appointment, Mr. Mosher has been general manager of the Peerless Motor Co., a Peerless subsidiary operating the factory branches. Mr. Mosher began his automotive experience as a bookkeeper for the Olds Motor Works in 1905.

Bendix Given Testimonial

Vincent Bendix, president of the Bendix Brake Corp., was given a testimonial dinner by South Bend and Chicago friends at the Chain-o-Lakes Country Club, South Bend. Guests included Clement Studebaker, Jr., and Col. G. M. Studebaker; A. R. Erskine, P. G. Hoffman, H. S. Vance and Rev. C. A. Lippincott of the Studebaker Corp. of America; W. J. Buettner, secretary and treasurer of the Bendix corporation; Lloyd Maxwell, president of Williams & Cunningham, and J. H. Merrell, vice-president Manhattan Rubber Co.

Frank Back From Europe

Arvid L. Frank, assistant manager of export sales for the Studebaker Corp. of America, has returned from a three months' business trip in England and other European points. Business conditions in Europe are fast becoming stabilized, according to Mr. Frank, and he expects Studebaker to reach new high sales records in foreign markets during 1928.

Utley Heads Commerce Board

S. Wells Utley, president of the Detroit Steel Castings Co., has been elected president of the Detroit Board of Commerce. Charles A. Sullivan, traffic manager of the Fisher Body Corp., has also been elected a director of the Board of Commerce.

Tetley to Go Abroad

M. C. Tetley, special factory representative of the H. H. Franklin Mfg. Co., will leave for Paris early in September to view the first showing ever made of Franklin cars in the international show to be held there. He will make a study of the body designs and late mechanical developments abroad and will visit factories of the more prominent makers.

Railroad Men to Study Air Transport Abroad

Charles S. "Casey" Jones, former test pilot and assistant sales manager of the Curtiss Aeroplane & Motor Co., Inc., and more recently appointed to assist Colonel Lindbergh on the technical committee of the Transcontinental Air Transport Co., sailed for Europe, June 17 on the Red Star liner Belgenland. Mr. Jones, who accompanies Major C. E. McCullough and Charles H. Matthews, Jr., of the Pennsylvania Railroad, will make an exhaustive study of commercial air transportation in Europe. These three men will visit England, France, Germany, Holland, Switzerland and Italy, returning about August 1.

Wilkinson Named Manager

George B. Wilkinson has been appointed district manager in the New York City territory by Blackhawk Mfg. Co. Mr. Wilkinson has been connected with the Blackhawk company as a junior representative and before that was sales representative for the Richards & Conover Co. of Kansas City.

Names New Representatives

The Roller-Smith Co., New York, has appointed John A. Coleman sales representative in the State of Texas with headquarters in Houston, and H. T. Weeks representative in Colorado, Utah, Wyoming and northern New Mexico with headquarters in Denver.

Bartsch Sails for Australia

A. H. Bartsch, sales manager for General Motors Australia; R. R. Schrenkeisen, dealer development manager, and H. B. Houston, Cadillac specialist for Australia, sailed June 27 from Vancouver to take up their new Australian activities.

Monahan Leaves N.S.P.A.

Charles W. Monahan has resigned as assistant merchandise service director of the National Standard Parts Association to become a sales representative of Diamond Motor Parts Co.

Rose Sees Coast Prosperous

H. E. Rose, sales promotion manager of Hupp Motor Car Corp., has returned to Detroit after a two-months trip to the Pacific Coast. He reports conditions improving in all this territory and is optimistic about the prospects for the remainder of the year.

Seiberling Buys Miami Home

Frank A. Seiberling, head of the Seiberling Rubber Co., will hereafter make his winter home each year at Miami, having purchased a beautiful residence in that city.

Aero Leaders Form Finance Corporation

Curtiss President Heads Organization Which Will Aid New Companies

NEW YORK, June 26—The National Aviation Corp. has been organized to participate in the business of established concerns in the airplane industry and to finance new companies. Clement M. Keys, president of the Curtiss Aeroplane & Motor Co., Inc., and director of the Transcontinental Air Transport Co., is chairman of the board of the new company, and J. C. Wilson of the financial house of J. M. Wilson & Co. and a director of Transcontinental Air Transport and Curtiss Aeroplane Export Co. and Curtiss Robinson Co., is president of this new company.

"It is not the purpose merely to trade in and out of aviation securities," said Mr. Keys, "nor is it intended that the company shall control any of the major aviation enterprises of the country. The charter is a broad one, so that the corporation may purchase the securities of established companies, alike in manufacturing, transport service and the technical and inventive branches of the trade."

The executive committee includes, besides Mr. Keys and Mr. Wilson, C. W. Cuthell, general counsel for Curtiss and National Air Transport and Transcontinental Air Transport; S. M. Fairchild, president of Fairchild Aviation Corp., and director of Colonial Air Transport; R. F. Hoyt, chairman of the Wright Aeronautical Corp. and of the Aviation Corp. of the Americas, and director of Transcontinental Air Transport; and Leonard Kennedy, vice-president of Curtiss and director of National Air Transport and Transcontinental Air Transport.

The board of directors includes, in addition to those already named, Howard A. Coffin, chairman of National Air Transport, and director of Transcontinental Air Transport; C. L. Lawrance, president of the Wright Aeronautical Corp., and W. S. Marvin, J. J. Mitchell, Jr., H. E. Talbot, Jr., E. H. Reynolds and David Sarnoff.

The board of directors is to include 22 members and two vacancies now remain open.

Buick Sales Gain 5000

FLINT, June 23—Buick retail sales in May exceeded April by 5000 cars, according to C. W. Churchill, general sales manager. Dollar value of retail sales in the first quarter was \$365,000,000.

N.A.C.C. Announces Contest

NEW YORK, June 26—The National Automobile Chamber of Commerce has announced the 1928 highway safety contest for schools, students and teachers.

This is the ninth such contest run and \$6,500 in prizes will be given. The contest is to open this fall and the date is not yet determined. The best student essay in the country will be awarded a gold watch and a trip to Washington, and the best teacher contribution will be awarded \$500 and a trip to Washington. There will also be state prizes.

Willys Reestablishes Dividend on Common

TOLEDO, June 23—Directors of Willys-Overland Co. voted this week to establish the common stock of the company on a \$1.20 dividend basis and authorized the payment of 30 cents a share Aug. 1 as the first of the new payments. John N. Willys, president, said the conservative dividend could be comfortably maintained without jeopardizing the financial or trade position or general policy and that supplementary disbursements would be made whenever earnings and business warranted. He said further:

"Based on the actual earnings for the five months ended May 31 and estimating the results for June the company will in the first half-year have earned by a considerable margin the entire dividend payment for the year on the common stock, preferred stock dividend, and the preferred stock sinking fund for the year, and \$1,000,000 bond payment which falls due Aug. 1. Cash and cash holdings currently aggregate \$12,000,000.

"The business of the company has never been in a sounder or more flourishing state. Sales for the year to date considerably exceed the entire total of 171,743 for 1927 and will in the first half year approach if not equal 200,000 cars. The May and June schedules have been the most ambitious in the history of the organization. Our distributing outlets have kept pace with our growth; the dealers' list is 5500, an increase of 1500 since Jan. 1. Unfilled orders insure our surpassing before the end of July our biggest year's output."

The company had not paid any dividends on common stock since November, 1920. The rate up to that time had been \$1 a year.

Ask Tighter Truck Credit

DETROIT, June 23—Truck manufacturers were asked to tighten credit terms as a means of discouraging irresponsible operators in the contract hauling field, this request being made at a meeting of truck manufacturers in the Book-Cadillac by the Associated General Contractors of America, Inc.

Lithuania Increases Duties

WASHINGTON, June 25—Lithuania has issued a decree increasing duties on automobiles, tires and gasoline, according to a cablegram from R. W. Heingartner, consul at Kovno.

Financial Notes

Murray Corp. of America in its consolidated balance sheet as of March 31 shows current assets of \$8,497,459 against current liabilities of \$1,834,868. Current assets include cash of \$1,155,405, receivables of \$3,223,932 and inventories of \$4,118,121. Total assets was \$20,473,138. Surplus totaled \$643,700.

Modine Mfg. Co. common stock has been admitted to trading on the Chicago Stock Exchange. The company shows net profit of \$129,629 in the first quarter this year. Earnings in the full year 1927 were \$317,205. The balance sheet as of March 31, 1928, shows total current assets of \$904,996 and current liabilities of \$235,895. Assets total \$1,138,039.

Packard Electric Co. has declared a quarterly dividend of 70 cents and an extra dividend of 30 cents payable July 15 to stockholders of record June 30.

Federal Motor Truck Co. earned 20 cents a share in the four months ended April 30.

Motorcycle Makers Plan General Use of Mufflers

SPRINGFIELD, MASS., June 27—At a meeting of the Motorcycle & Allied Trades Association at the Indian Motorcycle Co. plant, June 25, the subject of safe operation of motorcycles on the highways received special attention. Means of promoting the wider use of these vehicles and reducing objections raised against them by realty interests, home owners and others were discussed. In the latter connection Louis E. Bauer of the Indian company and Walter Davidson of the Harley-Davidson company said that all models produced by their companies the coming year would have closed mufflers. It was reported that other companies are falling in line with this general trend.

James Wright, president of the Wright Spark Plug Co., of Auburn, N. Y., president of the association, presided. Others in attendance were D. M. Grossmith of the Henderson-Excelsior Co., Chicago; Henry Messinger of the H. & F. Messinger Mfg. Co., New York, and H. G. Alexander of the Cleveland Motorcycle Co., Cleveland.

Auburn Week Brings Gains

AUBURN, IND., June 25—Auburn Automobile Co. reports large increases in retail sales as result of the "Show Me" week which closed June 17. Distributors and dealers in many cities reported increases of 100 per cent over normal expectancies. The event was staged in 13 major cities and 300 smaller communities.

G.M. Employment Higher

NEW YORK, June 29—General Motors employees as of May 31, 1928, numbered 208,228, the highest on record. The previous record, as of April 30, was 207,690. This May figure compares with 183,893 in May of a year ago.

Steel Prices Show Downward Trend

Full-Finished Automobile Sheets Hold Firm—Extras Aid Steel Producers

NEW YORK, June 28—The steel market is running true to midsummer form. What price changes are noted are in a downward direction while irregularity manifests itself more and more in those descriptions of steel in which no out-and-out declines have taken place. Full-finished automobile sheets continue, however, to hold their own at 4 cents, Pittsburgh, being somewhat of an exception from the generally prevailing conditions.

Manufacturers of cold-finished steel bars have lowered their third quarter contract price by \$2 a ton to 2.10 cents, Pittsburgh and Chicago, and 2.15 cents, Cleveland. The reduction is attributed to pressure by automotive consumers. The new price for the cold-finished product would seem to make it highly questionable whether hot-rolled steel bar producers will be able to establish the 1.90 cent price which they announced for third quarter a few weeks ago. Even if the cold-finishers pay only the supposedly going market price of 1.85 cents, a 2.10-cent price for their cold-finished product means only \$5 per ton for conversion, and while 2.10 cents was the market price for cold-finished bars during the last quarter of 1927, finishers then were able to buy hot-rolled bars at below 1.85 cents.

The market for hot-rolled strip steel is ragged. Considerable discussion has been stirred up by the fact that prices have been quoted on specifications that carry heavy extras which, when the base price is figured out, disclose sharp cuts under the supposed market. The mills have come to figure each order by itself, and quite frequently there is a fair margin of profit on the flat price quoted because of the extras.

Pig Iron—Movement of pig iron to automotive foundries continues fair. New business is being placed slowly. While competition among blast furnaces is keen, there is little disposition to sacrifice price. The Valley foundry iron market is easy at \$16.75, furnace, with malleable firmer but not higher in price.

Aluminum—Good-sized tonnages of aluminum continue to be worked up into pistons and other parts. Both the domestic producer and importers seem to be marking time for the present.

Copper—The market has turned quiet, but with electrolytic steady at 14½ cents, delivered Connecticut and 14½, delivered Middle West, producers can well afford to bide their time.

Tin—While the general impression is that tin is due for an upward reaction, the recent performance of the market has had the effect of making buyers very cautious.

Lead—Neither buyers nor sellers appear anxious to contract far in advance. The market rules quiet and unchanged.

Zinc—Following a fair volume of sales, the market turned more quiet with prices steady.

Seek Lower Freight on Plane Shipments

MOLINE, June 23—Reductions of approximately \$100 a plane in freight rates have been sought by Velie Motors Corp. and the Mono Aircraft Corp. upon shipments of planes, via railroad, to Eastern points, at a hearing before the Illinois Freight Association. The hearing is attracting wide attention because prior to the Mono Aircraft large scale production, few, if any, planes were shipped by freight. Because of this rates were never adjusted and the freight tariff is higher than the express schedule. Six Monocoupees can be packed in one car, if the wings are detached, and the Monocoupee company has become a pioneer in rail shipment of these machines. Substantial reductions upon shipments to the West coast have already been granted.

Unrestricted Travel Lanes Aiding Aviation Growth

BOSTON, June 23—More than 100 delegates attended the second New England Aviation Conference here this week sponsored by the New England Council. General John F. O'Ryan, president of the Colonial Air Transport, Inc., of New York; William B. Stout, of the aircraft division of Ford Motor Co., and President Stedman Hanks, of the American Airports Corp., were the principal speakers.

General O'Ryan said that both motor car and railroad transportation have reached their peak of commercial speed efficiency because of the handicaps imposed by the restricted areaways of travel available for those mediums. On the other hand he pointed out the airplane, which is of itself comparably more speedy, affords almost limitless possibilities for future development because of the unrestricted travel lanes which are open to it.

Wire Wheel Sets Record

BUFFALO, June 24—Gross sales of Wire Wheel Corp. in May totaled \$406,000 and production of wire wheels totaled 41,492, both figures a record for any one month in the company's history. Gross sales in the first five months totaled \$1,912,567, an increase of 90 per cent over the 1927 period.

Crude Rubber Stocks Lower

NEW YORK, June 25—Trading in the rubber market was very quiet last week although the undertone was strong, according to F. R. Henderson Corp. Stocks of crude rubber in London showed a further decrease to 41,185 tons. Arrivals in New York from June 1 to June 21 are estimated at 15,300 tons.

French Field Narrows as Leaders Strengthen

Control of Market by Fewer Companies Seen Following Expansion Trend

PARIS, June 13 (by mail)—Reports of financial difficulties confronting several French automobile manufacturers give reason to believe that during the next two or three years the number of automobile concerns will diminish in important proportions. There are at present practically 100 firms producing a total of 200,000 cars a year, many of them having an output of less than 500 cars a year. Apart from foreign competition, which is becoming more and more active on the French market, these small firms are being forced out by the activity of half a dozen powerful French concerns such as Citroen, Renault, Peugeot and Berliet. It is certain that the same general tendencies will be observed here as in the United States, the large number of small firms being replaced by a smaller number of big and powerful organizations.

The capital of the Citroen company will shortly be increased from 300 to 400,000,000 francs with a view principally to increased output and the production of a cheap six-cylinder model. This new model has been fully tested and is now ready for production. It has a six-cylinder engine of about 145 cu. in. piston displacement, standard track, and has been laid out from beginning to end with low production costs in view. It has not yet been officially decided when it will come on the market, but probabilities are that it will make its appearance just before or at the opening of the Paris Salon, next fall.

The capital of the Peugeot Automobile Co. will be increased, at a special meeting to be held early in July, from 90 to 190,000,000 francs by the creation of 20,000 A shares and 180,000 ordinary shares of 500 francs each issued at 525 francs. Important changes in the management are announced and probably Italian commercial interests will become prominent.

Finland Imports Lower

WASHINGTON, June 23—Automobile imports to Finland have dropped this year compared with last, according to a report from Helsingfors received by the Department of Commerce. Only 665 passenger cars were imported in April, 1928, as compared with 954 in April, 1927. The total for the first four months of 1928 was 1492 against 1655 for the same period of 1927.

Canada G.M. Ships 17,772

DETROIT, June 23—General Motors of Canada, Ltd., established an all-time production record in May when 17,772 cars and trucks were shipped.

Exports, Imports and Reimports of the Automotive Industry for May of Current Year and Total for Five Months Ending May, 1928

	Month of May 1927		Month of May 1928		Five Months Ending May 1927		Five Months Ending May 1928	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobile parts and accessories.....	..	\$40,678,800	..	\$46,650,107	..	\$183,053,755	..	\$204,829,156
Electric trucks and passenger cars.....	11	16,973	26	22,368	47	64,186	72	86,335
Motor trucks and buses, except elec. (total).....	10,533	6,778,852	9,061	6,388,809	47,934	30,090,153	47,899	33,420,263
Up to 1 ton, inclusive.....	9,003	4,279,473	6,600	3,497,747	40,206	18,414,218	36,728	18,906,581
Over 1 up to 2 1/2 tons.....	1,353	1,950,499	2,119	2,308,442	6,734	8,701,592	9,801	11,165,774
Over 2 1/2 tons.....	177	548,880	342	582,620	994	2,974,343	1,378	3,347,913
PASSENGER CARS								
Passenger cars, except electric (total).....	30,658	22,780,075	38,851	28,217,696	138,961	101,094,755	158,268	115,686,842
Value up to \$500, inclusive.....	5,720	2,099,261	..	..	38,219	14,199,335	..	..
Over \$500 up to \$800.....	11,792	6,558,949	..	..	46,231	26,924,335	..	..
Value over \$800 up to \$1200.....	8,391	7,107,582	..	..	26,554	32,412,417	..	..
Value over \$1200 up to \$2000.....	3,665	4,468,839	..	..	13,893	17,563,967	..	..
Value over \$2000.....	1,093	2,545,444	..	..	4,064	9,994,701	..	..
PARTS, ETC.								
Parts, except engines and tires.....	..	..	..	..	..	..	..	..
Automobile unit assemblies.....	..	5,052,250	..	5,301,252	..	22,845,935	..	24,726,716
Automobile parts for replacement.....	..	3,976,202	..	4,179,162	..	19,176,101	..	20,293,117
Automobile accessories.....	..	810,518	..	827,178	..	3,719,662	..	3,739,611
Automobile service appliances (n. s. s.).....	..	734,522	..	839,359	..	3,518,031	..	3,065,865
Trailers.....	35	21,866	85	26,642	413	180,697	297	143,596
Airplanes, seaplanes and other aircraft.....	4	44,314	17	210,288	18	308,165	80	832,722
Parts of airplanes, except engines and tires.....	..	11,693	..	141,469	..	110,741	..	420,090
BICYCLES								
Bicycles and tri-cycles.....	202	6,256	538	19,501	1,857	53,403	2,224	64,780
Motorcycles.....	1,843	401,279	2,371	544,960	9,635	2,160,203	9,126	2,112,066
Parts, except tires.....	..	116,834	..	147,389	..	586,087	..	608,645
INTERNAL COMBUSTION ENGINES								
Stationary and Portable								
Diesel and Semi-Diesel.....	49	150,153	107	53,514	304	570,835	293	368,099
Other stationary and portable:								
Not over 10 Hp.....	2,501	206,733	3,642	316,854	12,327	1,041,626	14,957	1,295,572
Over 10 Hp.....	164	176,711	217	93,354	659	642,404	1,084	478,978
Automobile engines for:								
Motor trucks and buses.....	667	80,632	1,472	119,662	2,694	293,606	5,980	633,158
Passenger cars.....	22,112	1,252,698	16,912	1,593,930	57,726	5,769,357	59,320	6,243,109
Tractors.....	74	30,113	99	18,305	786	363,644	251	65,446
Aircraft.....	2	28,103	12	49,949	17	109,322	58	208,516
Accessories and parts (carburetors).....	..	255,693	..	388,132	..	1,669,702	..	1,571,649
IMPORTS								
Automobiles and chassis (dutyable).....	80	136,740	56	101,754	229	426,474	184	454,900
Other vehicles and parts for them (dutyable).....	..	9,653	..	27,297	..	84,980	..	205,833
REIMPORTS								
Automobiles (free from duty).....	34	34,538	32	31,657	88	141,606	122	123,793

Ohio May Sales Increase 12 Per Cent Over April

COLUMBUS, June 23—New car sales in 60 Ohio counties, containing upward of 80 per cent of the population of the state, during May were 12 per cent higher than in April and 6 per cent higher than in May, 1927. The records were compiled by Gaylord R. Ford, acting manager of the Ohio Council of the National Automobile Dealers Association cooperating with the Bureau of Business Research of Ohio State University. Sales of new trucks were 7 per cent higher both over April this year and May of last year.

In all there were 22,742 passenger cars sold in May, 1928, compared with 21,471 cars in April and 22,109 in May, 1927.

N. J. Sales in May 11,757

NEW YORK, June 23—Sales of cars in New Jersey during May amounted to 11,757, as compared with 10,966 in May of last year, according to Sherlock & Arnold. Total sales from the beginning of the year are 47,663, as compared with 47,168 for the same period in 1927.

C.I.T. Opens Cuban Office

NEW YORK, June 23—Commercial Investment Trust Corp., through a subsidiary, has opened an office in Havana, Cuba, for the purpose of offering a complete finance company service along the lines of the well-known C.I.T. policy which has been so successful elsewhere. This is the second C.I.T. office

to be opened in this part of the world during the past few months, the office in Porto Rico having been established recently.

Logangear Adds Equipment to Make Pumps and Parts

TOLEDO, June 23—The Logangear Co., of which C. O. Miniger is chairman of the board, has announced that it will augment its working forces by adding 200 workers and will start the manufacture here of automobile pumps and parts. It is understood the new lines grow out of the close working arrangement between Mr. Miniger and the Monroe Auto Equipment Co., announced a few weeks ago.

About \$150,000 in new machinery will be placed in the Logangear plant to take care of the requirements for the new lines.

Defiance Plug Builds Addition

TOLEDO, June 23—The Defiance Spark Plug Co. here is building a \$25,000 addition to its plant to be completed about Aug. 1. The new unit will provide sufficient floor space to double the working operations of the company.

Names Potter & Dugan

CLEVELAND, June 18—Gears & Forgings, Inc., manufacturer of gears, forgings, speed reducers, and special machinery, has appointed Potter & Dugan, Inc., Erie County Bank Building, Buffalo, as district sales representative for Buffalo and vicinity.

Wico Electric to Start New Magneto Production

SPRINGFIELD, MASS., June 25—Wico Electric Co. has shown a decided gain in production recently and is now operating at full capacity. The new Type B magneto for small single and twin-cylinder engines counts as a special factor in bringing an increase of orders. This magneto is used for motorcycles and is finding a good market in road-building and general construction fields. The new type H-4 magneto for four-cylinder engines is to be put in regular production before the end of the summer. This will have a wide application to the automotive field.

The London plant of this company has increased its production by 50 per cent since the beginning of this year. Ralph L. Hartwell, general superintendent of the Springfield plant, has sailed for London to assist in putting new models into production in the English factory.

Offers New Rubber Products

DETROIT, June 25—Yellow Jacket paint spray hose is now being produced by Detroit Rubber Products, Inc. The hose has a tinned-brass tube, is highly resistant to duco and lacquer, and does not rust or discolor fluid.

A bus glass run channel has also been added to the Sphinx line. It is heavier than the section used in the standard closed passenger car and a large volume production is under way.

Auto-Lite and USL Surplus \$5,243,450

TOLEDO, June 23—The Electric Auto-Lite Co. now has more than 5500 workers on its payroll, which is the largest number in history of the business. Production in the first two weeks of June was more than the entire month a year ago.

President C. O. Miniger sees a very healthy outlook for the automotive industry in the last half of the year and an especially good volume of business for his company based on contracts and schedules. It is understood that Ford business done by the company is increasing each month.

Following the completion of the merger with the USL Battery Corp. and its subsidiaries, the pro forma balance sheet as of March 31 shows total assets of \$19,538,475 with surplus of \$5,243,450. Current assets total \$8,317,508 and current liabilities are \$3,716,901. The company now has outstanding 890,000 shares of no par common stock and \$4,200,000 of 7 per cent preferred.

A dividend of \$1 a share on common will be paid July 2. Preferred dividends for the month of June will also be distributed at that time.

Hungary Adds Luxury Tax

WASHINGTON, June 24—The Department of Commerce is advised that Hungary has placed new luxury tax rates on automobiles with motor trucks and motor buses exempt. The rates are graduated from 5 per cent on automobiles less than 14 hp. to 15 per cent on automobile of more than 24 hp. A 10 per cent rate is fixed on automobiles of from 14 to 24 hp. Parts of such automobiles are taxed from 5 to 15 per cent and motorcycles are taxed 5 per cent. This luxury tax is levied on the "c.i.f." value at port of entry plus duty. The new rates were effective May 14.

Coming Feature Issue of Chilton Class Journal Publications

Oct. 10—Marketing Annual for
1929—Motor World Wholesale.

Michigan Gains Largest in Exports During 1927

WASHINGTON, June 24—Total exports of merchandise by states of origin for the calendar year of 1927 aggregated \$4,758,721,078, according to figures compiled by the Department of Commerce and announced this week. The largest exporting state was New York with a total of \$769,766,896, followed by Texas with \$647,026,141 and Michigan with \$326,879,584. The 1927 exports were \$45,168,012 greater than the 1926 exports.

Largely through its increased exports of automobiles and accessories, Michigan showed the largest increase in 1927 over 1926. The figures show that the total automobile exports from Michigan during 1927 were \$270,635,367. The second state, from a standpoint of exports of automobiles and tires was Ohio, with a total of \$51,312,276, followed by Wisconsin, \$23,833,341; New Jersey being fourth with \$22,518,082; followed by Indiana, fifth, with a total of \$20,089,088 worth of automotive exports.

Welding Show Space in Demand

PHILADELPHIA, June 25—More than half of the space for the exhibit to be held in connection with the fall meeting here of the American Welding Society has been applied for, according to a society statement. The exhibit is held in cooperation with the American Society for Steel Treating at the Commercial Museum. Technical sessions will be at the Bellevue-Stratford Hotel.

10% Export Increase Predicted for 1928

NEW YORK, June 23.—Foreign Trade in 1928, the proceedings of the Houston convention of the National Foreign Trade Council, has just been published and indicates that the country is in the midst of the greatest foreign trade year since the war. The world's export trade this year will be more than 10 per cent greater than the corresponding trade carried before the war, in the estimation of the council.

The 48 principal nations operating commercially in territories without their own limits did an export business in 1927 of \$19,487,000,000, which compares with \$18,400,000,000 in 1925, the first year to exceed pre-war volume.

The next convention of the council will be held in Baltimore some time during April, 1929.

Canadian Exports Lower

WASHINGTON, June 24—Canadian automobile exports in April totaled \$1,751,805, a decrease of 9 per cent as compared with March. Shipment of low and medium priced passenger cars increased 6 per cent, while the number of cars valued at more than \$1,000 showed a 48 per cent decrease in shipments, according to the Department of Commerce. Canadian production of motor vehicles reached the highest figure for the year, being 186 per cent greater than in January; 39 per cent above the March figure, but 1.5 per cent less than in the corresponding month of 1927.

Paris Used Car Fair Flat

WASHINGTON, June 23—The Paris used-car fair, held in connection with the annual "Foire de Paris," was practically a failure, the Department of Commerce is informed in a dispatch from Paris. Little public interest was aroused and sales were comparatively small.

Calendar of Coming Events

SHOWS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-23
American Road Builders Association, Inc., Cleveland Auditorium...Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia...Oct. 8-13
American Welding Society, Commercial Museum, Philadelphia...Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago...Oct. 22-27
Berlin...Nov. 8-18
Brussels...Dec. 8-19
*Chicago...Jan. 26-Feb. 2
International Aeronautical Exposition, Grand Palais, Paris...June 29-July 15
Leipzig...Aug. 26-Sept. 1
London, passenger cars...Oct. 11-20
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York, Grand Central Palace...Jan. 5-12
Paris, passenger cars...Oct. 4-14
Paris, trucks...Nov. 15-25
Prague...Sept. 1-9
Salon, Automobile Salon, Inc., Hotel Drake, Chicago...Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles...Feb. 9-16
Salon, Automobile Salon, Inc., Hotel Commodore, New York...Dec. 2-8

Salon, Automobile Salon, Inc., Palace Hotel, San Francisco...Feb. 23-Mar. 2
* Will have special shop equipment exhibit.

CONVENTIONS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Gear Manufacturers Association, Statler Hotel, Buffalo, N. Y., Oct. 11-13
American Road Builders Ass'n, Inc., Cleveland Auditorium...Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia...Oct. 8-13
American Welding Society, Commercial Museum, Philadelphia...Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago...Oct. 22-27
National Association of Automobile Show and Association Managers, Before-Shows, Drake Hotel, Chicago...July 26-27
National Safety Council, National Congress, New York...Oct. 1-5
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3

Society of Industrial Engineers, Rochester, N. Y.Oct. 17-19
World Motor Transport Congress, RomeSept. 25-29

A. S. M. E.

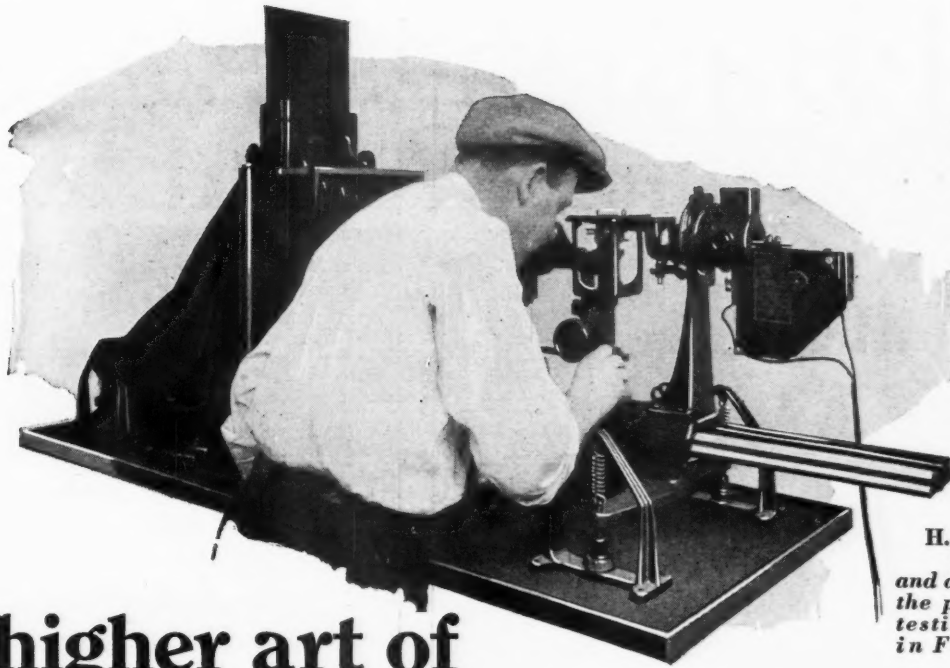
Cincinnati, Oct. 22-25—Machine Shop Practice.
Cleveland, Sept. 17-20—Fuels.

S. A. E. National

Chicago, Aeronautic MeetingDec. 6-7
Detroit, Book-Cadillac Production MeetingNov. 22-23
Detroit, Book-Cadillac Annual MeetingJan. 15-18
Los Angeles, Aeronautic Meeting, Sept. 13-14
Newark, Robert Treat Hotel, Transportation MeetingOct. 16-18
New York, Annual Dinner, Hotel AstorJan. 10

RACES

BelgiumAug. 12
FranceJuly 1
GermanyJuly 15
Great BritainSept. 22
ItalySept. 2
SpainJuly 29



H. B. PULSIFIER
Chief Metallurgist
and device which makes
the photomicrograph,
testing all steel used
in Ferry Products.

The higher art of cold up-setting and heat treatment

IT is the infinite care that we take in every manufacturing process that marks the difference in Ferry Screws.

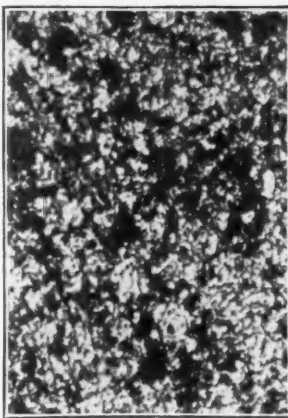
For instance, it is obvious that all steel looks alike to the unaided eye. So we protect the fine dimensions and absolute trustworthiness of every Ferry product by making painstaking tests of all raw material before it is put into production.

Photomicrographs like the one shown are evidence of

the constant surveillance of Ferry materials that goes on in our laboratory.

This care of ours has a definite meaning to you. It means freedom from doubt, for Ferry processes deserve the absolute dependence that screws must be given once they are in the job. It means too, the satisfaction that comes from dealing with one of the oldest and best established manufacturers in the business.

Longitudinal Section:
Cold-Heading Wire; S. A. E. 2330.
Etched to show Solidity and Fineness
of Grain. Magnified 200 Diameters.



"If it's a Ferry Product

You can depend upon it"

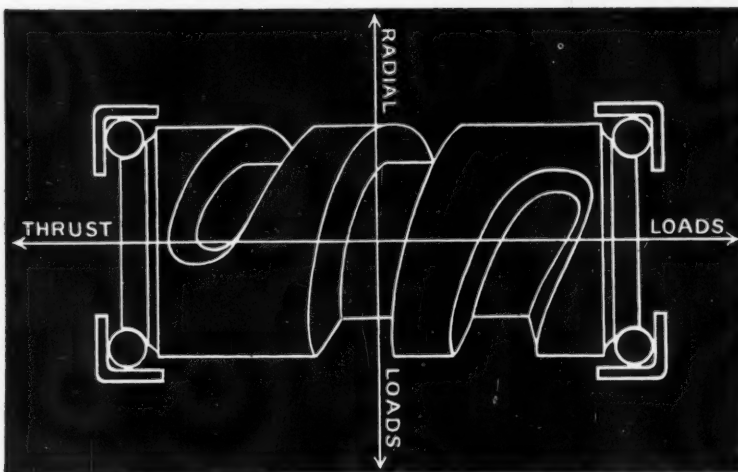
FERRY CAP & SET SCREW COMPANY • Cleveland, Ohio

FERRY

PROCESS SCREWS

Ball-Bearings...for Both THRUST and RADIAL Loads

Help make
ROSS *Steer*
Easier



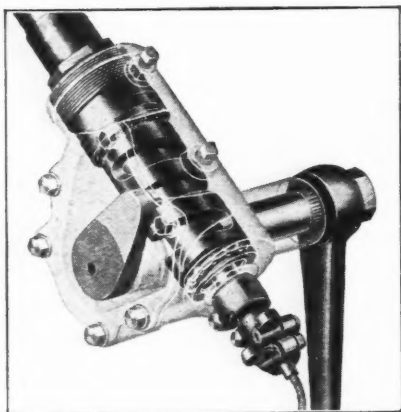
BECAUSE of its unique cam-and-lever principle, the Ross Cam and Lever Steering Gear naturally steers more easily than the ordinary steering gear.

Yet Ross makes this steering *even more effortless*, and makes the need for adjustments less frequent, by the use of ball-bearings to take *both* thrust and radial loads.

Ross is the *only* steering gear using ball-bearings to take *radial* loads, as well as thrust loads. In the Ross Cam and Lever Steering Gear, it makes no difference from what angle the load is applied—it is always taken by free-running, durable ball-bearings—not by bushings.

To the driver of a Ross-equipped car this means *easier* wheel-turn, for less of the effort he applies at the steering wheel is lost through friction in the steering gear itself. Add to this the control of road-shock, and the road-sympathy found in Ross Cam and Lever Steering, and you will understand why it is so widely preferred by the manufacturers of cars, trucks and buses.

ROSS GEAR & TOOL CO. ❖ LAFAYETTE, IND.



The balanced qualities of Ross Steering are largely the result of these features in which the Ross Cam and Lever Steering Gear differs from the ordinary type of steering gear:

- Variable Ratio of Cam
- Line Contact Between Actuating and Actuated Members
- Low Internal Pressures
- Powerful Internal Leverage
- High Over-All Efficiency

ROSS *Cam AND Lever* STEERING

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off.
Established 1902

Volume 58

Number 26

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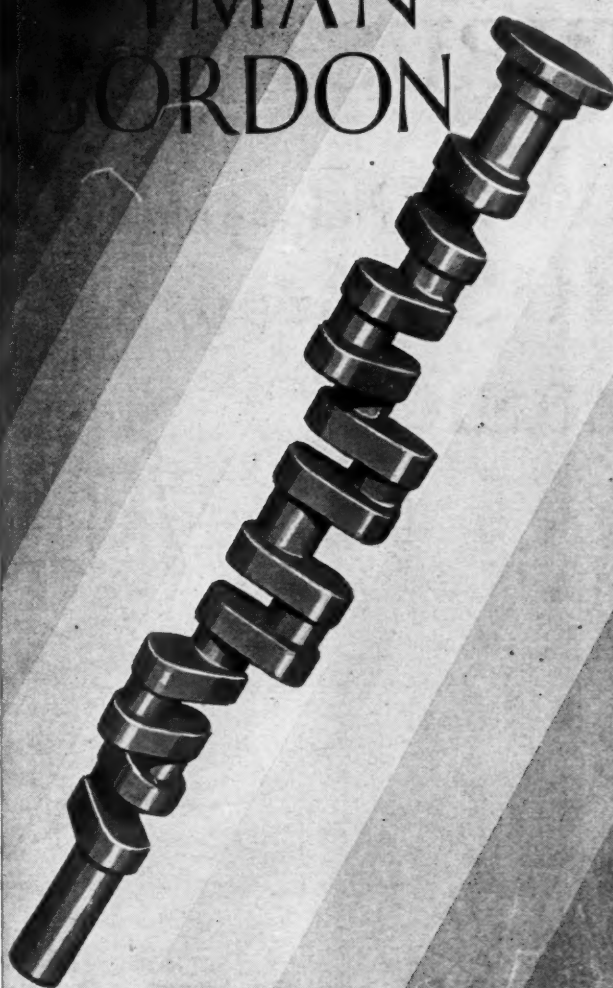
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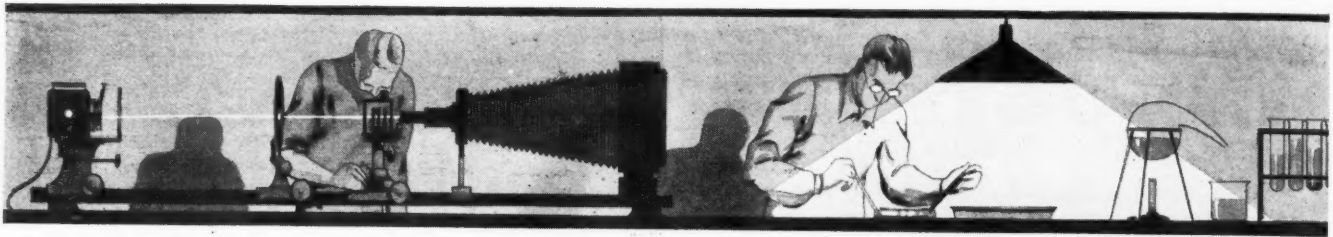


WYMAN-GORDON

correct crankshaft
design and smooth
motor performance
go hand in hand



The Crankshaft Makers
Worcester, Mass.
Harvard, Mass.



Where quality must prevail



RELENTLESS competition between automobile manufacturers has greatly increased the standard of motor car design and value. On the other hand, it has decreased prices. Naturally, whenever prices must be lowered, the purchasing department of any manufacturer must lean more and more towards economy.

There are certain units of any automobile which can be cut down in quantity or quality to help reduce costs. These units, more of the accessory or luxury type, do not greatly determine the performance of the car. But

—down in the heart of the chassis, the clutch, the steering column, the steering knuckle—wherever fine performance depends upon the almost total elimination of friction—quality must prevail and every unit, every thrust bearing, selected for 100% efficiency.

Thrust Bearings—unseen because they are forever at work in the vital parts of the car—unfamiliar to the car owner because they are seldom brought to his attention—*must* be dependable. And—if they are Aetna made and Aetna guaranteed—they are made to the regular Aetna standard of “precision beyond specifications.”

Our Engineering Department stands ready at any time to consult with any manufacturer in the design of special thrust ball bearings, or to quote on Aetna Bearings as standard equipment. Let us send you the latest Aetna Engineers' Catalog with complete specifications.

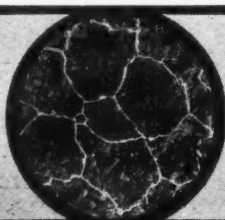
AETNA BALL BEARING MFG. COMPANY
2745 High Street

Chicago, Illinois

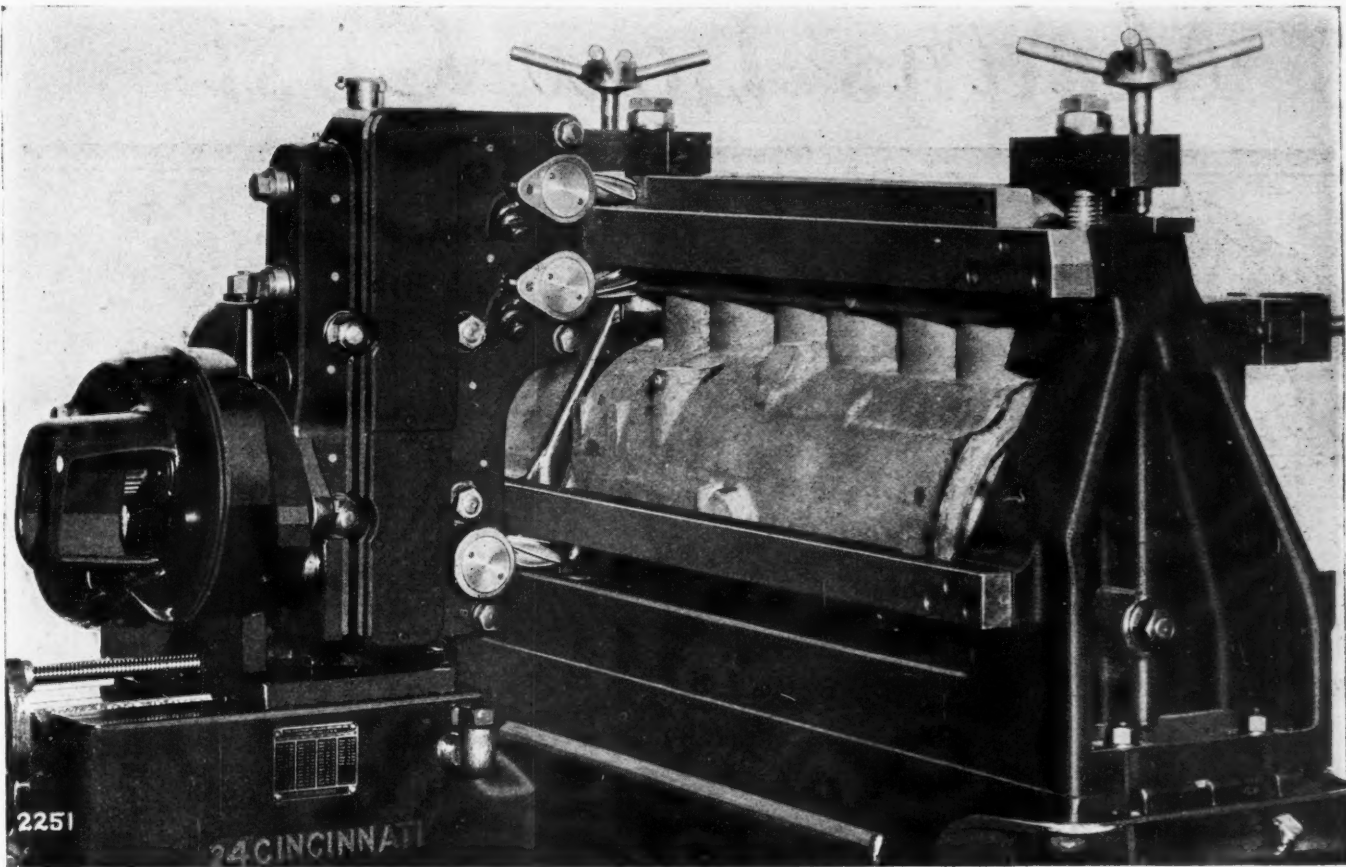
AETNA

THRUST BALL BEARINGS

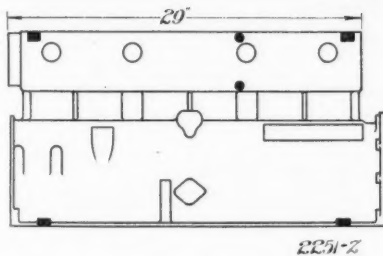
**NORMAL
STEEL**
Required for
Aetna Bearings.
Note the even
grain structure.



**ABNORMAL
STEEL**
Not up to Aetna
standards.
Note the uneven
grain structure.



Patented



Part Name—Cylinder Block.
Operation—Mill side locating pads.
Material—Cast-iron.
Stock Removed—1/16"
Cutters—3—1" dia. spiral end mills.
Feed—16.6 per minute.
Speed—300 R.P.M.
Time per Piece—1.3 minutes.
Machine—24" Wide Bed Plain with bed cut off in sand and 1 special 3-spindle carrier.

THREE SPINDLE EQUIPMENT FOR MILLING CYLINDER BLOCK PADS

The first machining operation on a cylinder block is shown here. Four locating pads and two small bosses at the center are milled at one setting by means of the spiral end mills. The block is held in a special fixture which is so designed that the work is held against three cast-iron locating bosses. These three bosses fit against the steel bars which are shown the length of the work between the cutters.

The work rests on a rocking support under each end. It is clamped at each end by a cam clamp and over the top by the pilot wheel clamp shown. This arrangement of locating and clamping allows the work to be slid in from the side of the table entirely in the clear.

Each spindle of the special carrier has an independent quill adjustment to take care of cutter wear.

The dog controlled full automatic table cycle of the machine makes this a fast operation, since it eliminates all cutting of air with the duty of the operator limited to loading and removing the work.

The Right Machine for the Job

CINCINNATI MILLING MACHINE CO., CINCINNATI, OHIO

CINCINNATI MILLERS

Efficient Production Means Low Cost—



DALLAS LOCK-SEAM TUBING

*Dallas Control of Every Operation
Insures Unqualified Efficiency at
Low Cost.*

The electric brass melting furnace shown above represents one of a score of operations necessary to produce an average length of DALLAS LOCK-SEAM TUBING. Unit production under one roof effects great savings — which are passed on to you.

DALLAS LOCK-SEAM TUBING is noted for its uniformity and high tensile strength. Scientific supervision of every operation in the various initial stages of production insures the exact grain and temper necessary for the best performance.



PRODUCTS

Brass &
Copper in
Coils.
Flat Sheets.
Special Tempers
and All Gauges

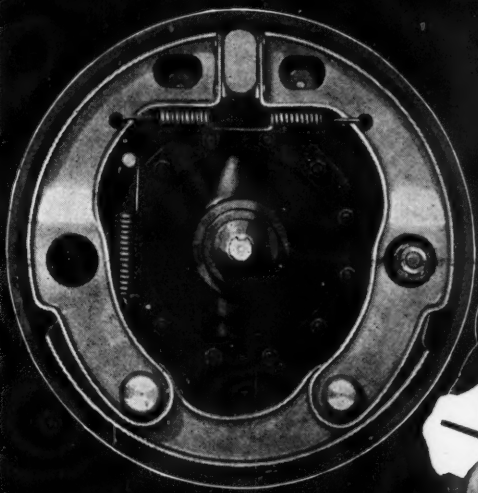
DALLAS BRASS & COPPER CO.

Stampings, Eyelets
Lock-Seam Tubing

*Dallas Lock-Seam Tubing can be
furnished in a variety of shapes and
sizes. The detail construction shows
the characteristic seam doubly pro-
tected with solder.*



820 ORLEANS STREET • CHICAGO



(Fully protected by
patents and applications
in U. S. and abroad)



Proof
of
sound judgment—
Bendix Mechanical 4-Wheel Brakes

The many thousands of new cars, coaches, and trucks daily going into use, equipped with Bendix Mechanical 4-Wheel Brakes, prove the sound judgment of the men who built them and of the men who buy them.

Drawing power from the moving car's momentum by the amazing self-energizing ability of the Bendix 3-Shoe Servo Brake; instantly positive and sure in their smooth action

because of Bendix Mechanical operation—Bendix Brakes are ideal for the man or woman at the wheel. A light pedal pressure is enough—you control your car in every emergency.

Simple in design, standardized in sizes, with replaceable shoes, built under conditions of maximum efficiency and economy—Bendix Brakes have won the enthusiastic approval of both the men who build cars, and the men who buy them.

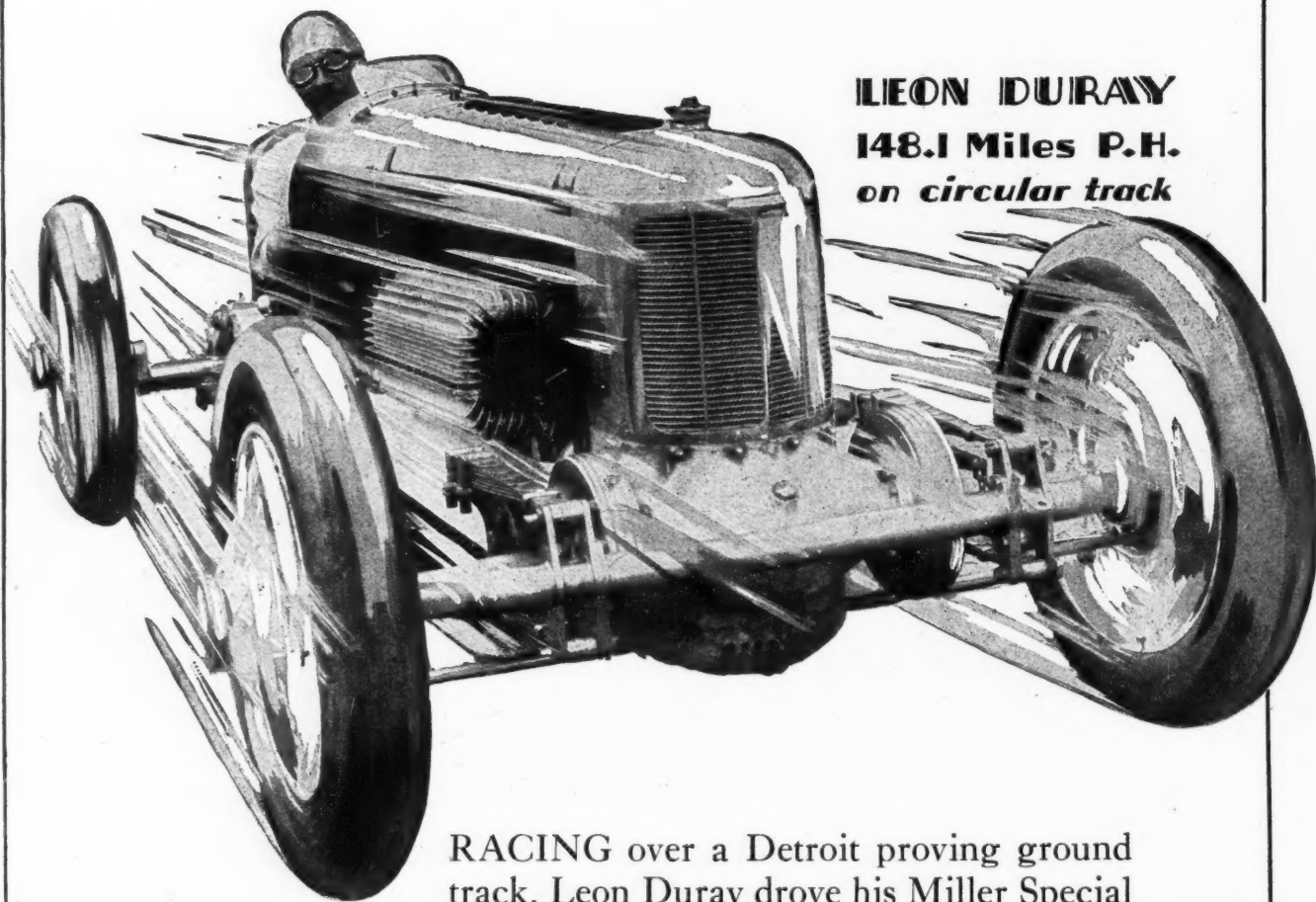
BENDIX BRAKE COMPANY
General Offices and Plant: South Bend, Indiana
Division of Bendix Corporation, Chicago

BENDIX
MECHANICAL



BRAKES
FOR SAFETY

Still Another World's Record Smashed on New Departures



LEON DURAY
148.1 Miles P.H.
on circular track

RACING over a Detroit proving ground track, Leon Duray drove his Miller Special equipped with 62 New Departure Ball Bearings the fastest ever clocked on a circular track—at 148.1 miles per hour.

Wherever the job calls for extra-reliability, freedom from friction and long life under extreme conditions, New Departures have the call.

You will find them in a large proportion of modern industrial machinery, automobiles, airplanes, motorboats and agricultural tractors.



THE NEW DEPARTURE MANUFACTURING COMPANY
BRISTOL, CONNECTICUT

Detroit

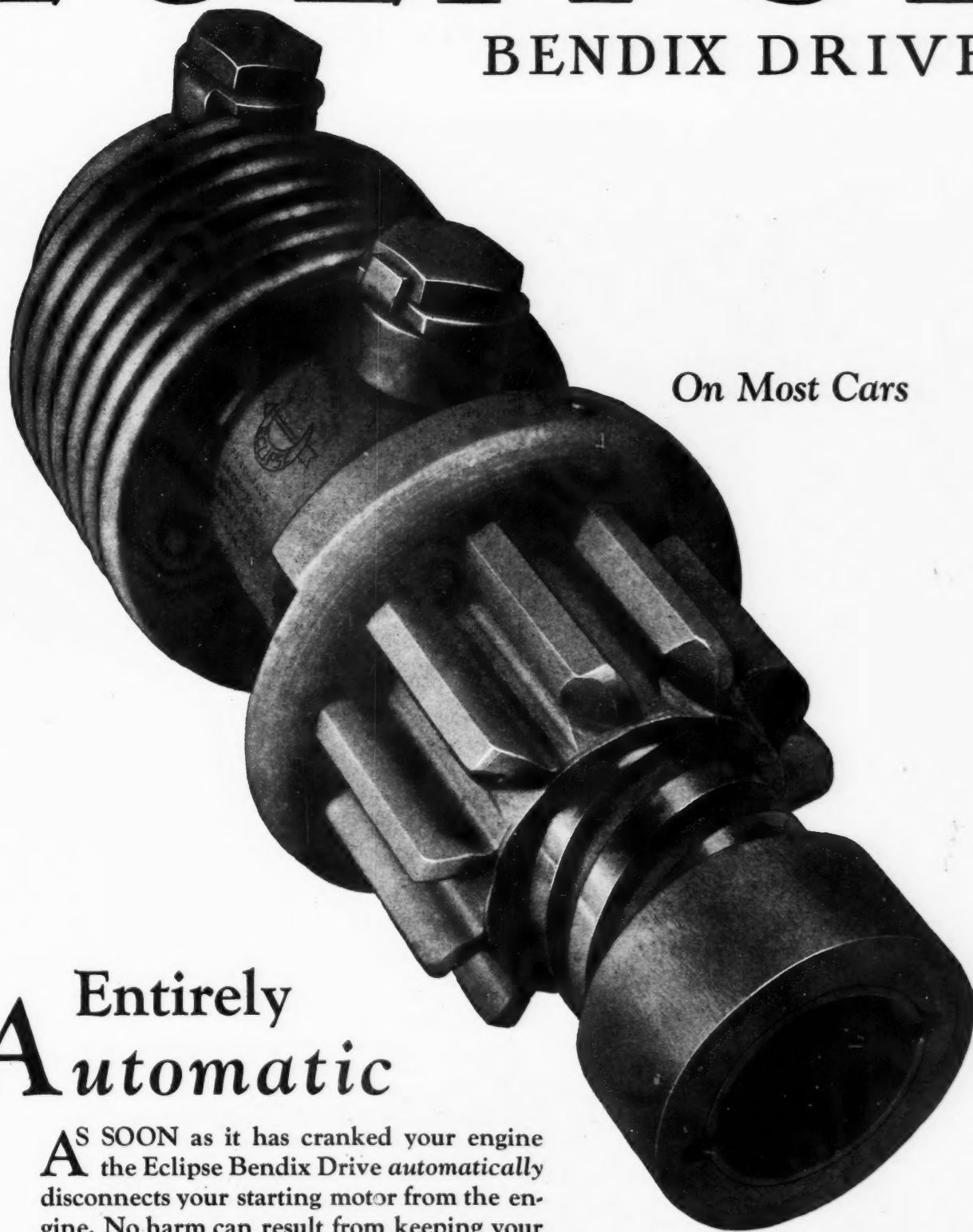
San Francisco

Chicago

NEW DEPARTURE
QUALITY
BALL BEARINGS

ECLIPSE

BENDIX DRIVE



On Most Cars

Entirely Automatic

AS SOON as it has cranked your engine the Eclipse Bendix Drive *automatically* disconnects your starting motor from the engine. No harm can result from keeping your foot on the starter-button, or even in accidentally touching the starter-button with your engine running. Truly—entirely *automatic*.

Approximately Twice Actual Size

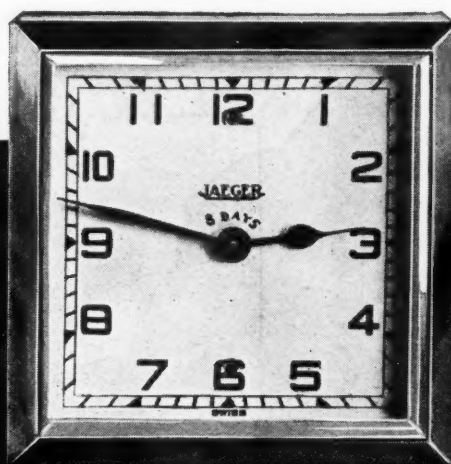
ECLIPSE MACHINE COMPANY, ELMIRA, N. Y.

Eclipse Machine Co., East Orange, N. J.



Eclipse Machine Co., Ltd., Walkerville, Ont.

8 DAY WATCHES FOR AUTOMOBILES



You can tell a fine motor watch not only by the time it keeps but also by the incomparable company it keeps. The 8 Day Jaeger Motor Watch is found only on such choice products as:

Cadillac Fiat Fleetwood Lancia La Salle Minerva
Packard Renault Hispano-Suiza Isotta-Fraschini

And numerous other quality motor cars.

JAEGER WATCH COMPANY

E. L. VAIL, VICE-PRES.

38 WEST FORTY-SEVENTH STREET, NEW YORK CITY

LONDON

GENEVA

PARIS

JAEGER

ANOTHER EXCLUSIVE FEATURE—JAEGER SERVICE STATIONS ARE LOCATED ALL OVER THE WORLD

Handles Within Easy Reach—
Simple to Operate—Quick to Set
Up and with no overhanging tools
the J & L Bar Machine is a
great producer

J&L
JONES & LAMSON

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont



“More Car for less Money”

In your endeavor to lower your manufacturing costs—so that you can give more car for less money—your first efforts are naturally directed toward improving the efficiency of your own organization.

But may we suggest that it might also pay you, in your search for new economies, to avail yourself of outside facilities and specialists, which offer advantages not to be found in your own plant?

Savings on Body Wood Work

The Mengel Company, for example, is making notable savings on wood body parts for automobile manufacturers.

Established in 1877, this Company has grown up in the wood-working industry. Mass production methods, little thought of fifty years ago, were introduced in the

Mengel plants at the very founding of the business.

Backed by years of experience in large-scale production of wood products, favorably situated to Southern hardwoods, our two modern automobile Body Wood Work plants at Louisville, are effecting real economies for the automobile industry. That is why more and more manufacturers are coming to us for their entire body wood work requirements.

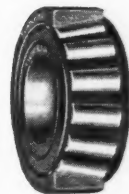
Mengel is also noted for *quality*. A substantial part of our business still comes to us from our original customers, or the interests that have succeeded them—customers who take first rank in important industries.

Put our experience of fifty years to work for you. Let us figure your entire requirements of Body Wood Work. A wire or letter will bring our representative.

THE MENGEL CO. INC.

AUTOMOTIVE DIVISION, LOUISVILLE, KY.

Mengel wood work saves money and worry



The Genuine- for a Real Job

Most of the cars on the road are equipped with Timken Bearings, for endurance, silence, economy, and efficiency.

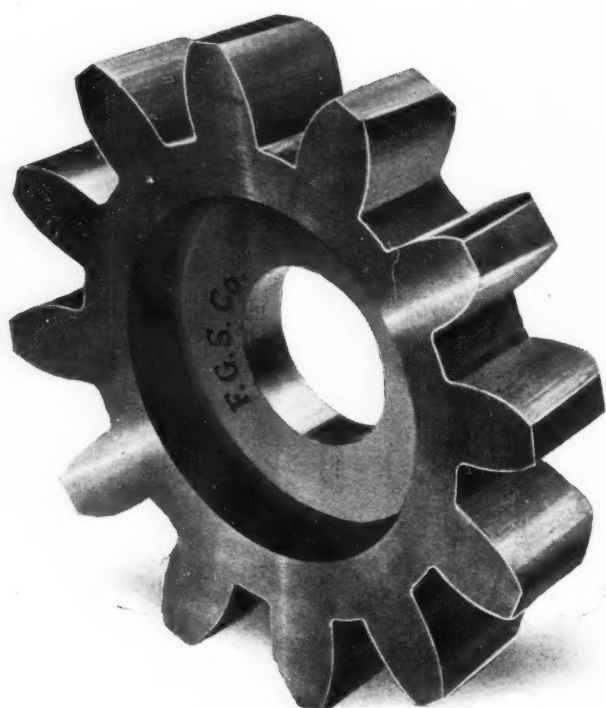
Service your cars with genuine Timken Bearings and maintain the same excellence which the car maker built in. Genuine Timkens protect you because their exclusive design and material protects motor car efficiency.

The right size of bearing and the right information on any Timken mounting is obtainable right near you. Telephone your Authorized Timken Distributor. There are hundreds of them, backed by Timken Direct Factory Branches.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

Technical information regarding bearing sizes and mountings is obtainable from the Timken Roller Bearing Service & Sales Company's Branches located in the following cities: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, Newark, New York, Omaha, Philadelphia, Pittsburgh, Richmond, St. Louis, San Francisco, Seattle, Toronto, Winnipeg

TIMKEN
Tapered
ROLLER BEARINGS

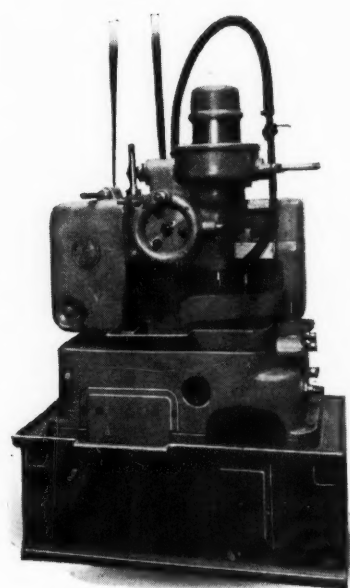


This Cutter is your GUARANTEE against gear- cutting troubles

In dealing with gear-tooth forms, a few thousandths of an inch make a world of difference. This is why the solution of a given problem requires seasoned ENGINEERING consideration—not mere tool-making.

Any Fellows Gear Shaper Cutter represents more than mere tool-making. There are THIRTY YEARS OF ENGINEERING in this tool—as a guarantee that no problem can come up with which we are unfamiliar.

When trouble develops, users of Gear Shaper Equipment have the satisfaction of knowing that we stand squarely back of them. Not only do we solve their problems, we *keep* them solved. Gear Shaper equipment is complete from driving pulley to cutting edge, and our responsibility does not end until you are getting both the quantity and quality of product you require. You are invited to let us explain the Gear Shaper proposition to you. Begin by reading "The Practical Art of Generating," sent free to all.



THE FELLOWS GEAR SHAPER COMPANY

Head Office and Works: 78 River Street, Springfield, Vt., U. S. A.

Branch Office: 1149 Book Building, Detroit, Mich.



Did you read it? . . . Here is the page advertisement that ran in the Saturday Evening Post of June 30 —part of Schrader's new educational campaign. Other magazines being used are: The American Magazine, Collier's, Liberty, Literary Digest, Country Gentleman, American Motorist, Farm Journal and Successful Farming.



ADVERTISING *that* benefits an Industry...

*"Don't always blame the tire," is the keynote of
Schrader's new educational campaign*

NOW, for the first time, the facts about improper tire inflation are being brought to public attention.

In a powerful new nation-wide educational campaign, Schrader is showing motorists how 80 per cent of all premature tire failures may be traced to their own carelessness. The causes and effects of improper inflation are described in detail—and three easy ways to avoid it are suggested.

Motorists are told that tire manufacturers are now building far greater mileage into their tires than was even dreamed of a few years ago. They are shown how neglect of the most elementary

rules of tire care is robbing them of this added mileage.

The whole industry will benefit from this advertising. Motorists are being given a new understanding of the vital importance of proper tire inflation. And they are being brought to realize that satisfactory tire service rests largely with themselves.

Full-page advertisements in this campaign appeared in the Saturday Evening Post of May 5, May 19, June 9 and June 30. The next advertisement will appear July 14. Others will follow. Everyone connected with the automotive industry is urged to follow this new advertising carefully.

A. SCHRADER'S SON, Inc., BROOKLYN
CHICAGO TORONTO LONDON

TIRE
VALVES

Schrader
Makers of Pneumatic Valves Since 1844

TIRE
GAUGES

All steamships came to it!
All railway coaches came
to it!—It is inevitable that
all automobiles, too, must
sooner or later come to the
protection that only all-
steel construction can give.

. . .

EDWARD G.

BUDD

MFG. CO.

Philadelphia and Detroit





CLARK TRUCK WHEELS

Every
thirty sec-
onds a new
Clark Truck
Wheel rolls
by the watch-
ful eye of our
inspectors after
passing the search-
ing test of a 100
ton press—so much
for quantity produc-
tion with schedules
running full speed. • •

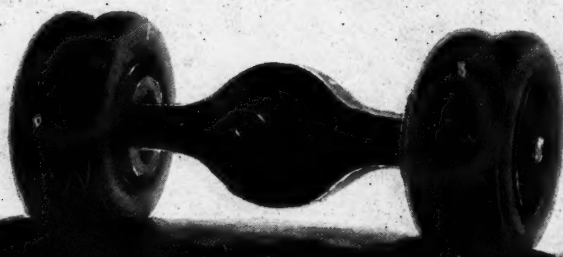
CLARK EQUIPMENT CO.
BUCHANAN -- -- MICHIGAN

With Strength of Steel

SPEEDING THE PROGRESS OF THE WORLD

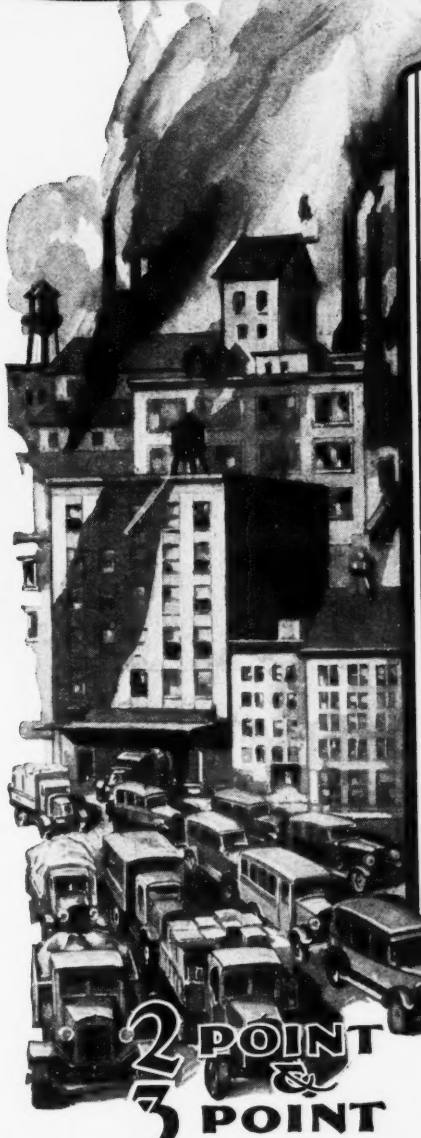
The steadily increasing volume of business coming to us from the larger truck manufacturers is evidence that the single reduction bevel gear of the Clark Axle type is the accepted design for the modern motor truck.

CLARK EQUIPMENT COMPANY
BUCHANAN · MICHIGAN



CLARK AXLES

Efficiency



2 POINT
&
3 POINT

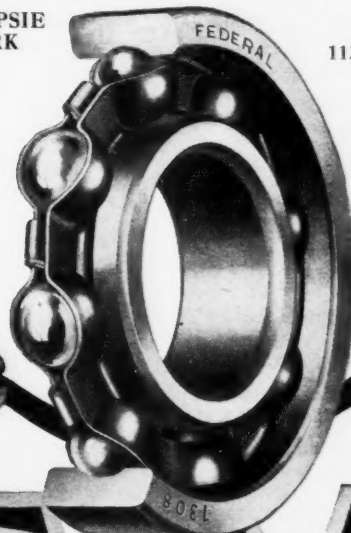
THE finest grades of steel correctly heat-treated are primarily responsible for the strength, sturdiness and stamina of FEDERAL RADIAL BALL BEARINGS. They stand up uniformly under the most gruelling service which ordinary bearings seldom survive. The great care and precision with which "FEDERAL" bearings are built has gained for them an enviable reputation throughout the industrial world. The use of FEDERAL RADIAL BALL BEARINGS will pave the way to increased efficiency.

We shall be pleased to forward samples, quotations and complete information to those interested

THE FEDERAL BEARINGS CO., Inc.

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NEW YORK

Detroit
Sales Office:
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FEDERAL

RADIAL BALL BEARINGS

Leadership



THE JEWELS
OF THE MOTOR

Bohn's pronounced leadership, in the production of babbitt lined bearings, is due to the wide experience and sound scientific knowledge possessed by the executive members of the Bohn organization.

For example: In the fabricating of Bohn Ring True Bearings, proper temperature control is insisted on in all melting operations.

To insure uniformity of products "heats" of convenient size are alloyed. This is aided by the large volume of our requirements. All heats are held within strict specifications and are constantly checked for chemical content by our own laboratory.

Babbitt is alloyed not only to our own specifications but when necessary according to specifications of our customers.

The same metallurgical supervision and analytical control given to the making of the babbitt ingot extends on through its re-melting and the babbitting of the bearing shell. Strict attention is paid to temperature control, the exclusion of dross and all other metallurgical considerations which are necessary in the production of bearings of quality and dependability.

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DETROIT-MICHIGAN
ALSO MANUFACTURERS OF NELSON BOHNALITE PISTONS AND BOHNALITE CASTINGS

When you say
"Invar Strut" Pistons
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NELSON
BOHNALITE
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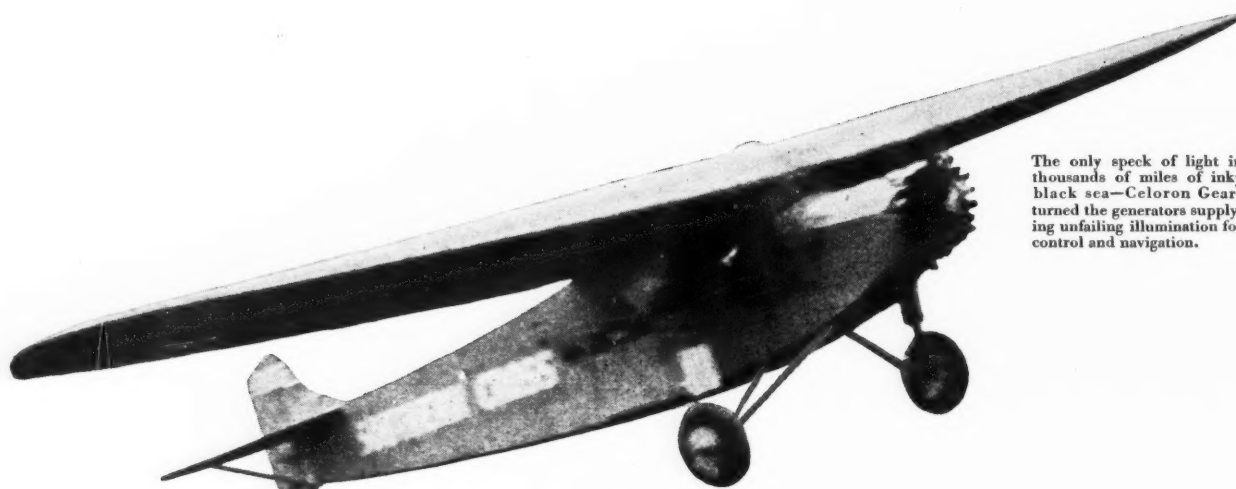
the *First* ~ the *Foremost*
and most widely adopted
Invar Strut Piston in
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Special alloy
steel Backbones
—the original In-
var Steel Struts—
are cast in, to con-
trol expansion and
maintain satisfac-
tory clearances under
all engine operating
conditions.

BOHN ALUMINUM AND BRASS CORPORATION
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Also makers of the famous Bohn Ring True Bearings



The only speck of light in thousands of miles of inky black sea—Celoron Gears turned the generators supplying unfailing illumination for control and navigation.

CELORON *flew with the* SOUTHERN CROSS



*Plane Dives—Generators
Shriek—Celoron Gears
Hold On*

During those anxious hours when the gallant Southern Cross pitched downward in great dives through depressing air currents and the plane's speed multiplied, the wind-driven generators (built by the Harris Electric Company of San Francisco) told the story in wild radio whines.

Through every such crucial test, the Celoron Gears emerged victorious, and continued to deliver uninterrupted, satisfactory service throughout the flight.

Many Records Broken

The transmitting and receiving sets, built by Heintz & Kaufman of San Francisco, in which Celoron was used. The transmitter is so constructed that it would actually work effectively under water.

Short-wave transmission was received in San Francisco direct from The Southern Cross the day the plane landed in Suva, 5,538 miles away.

Some of the other radio records broken by this equipment are as follows:—

Reliability and constancy of communication.

Amount of check up given to a plane as to its position while in flight.

Freedom from trouble in spite of extreme, adverse climatic conditions.



7,300 miles over sea. Through treacherous tropic storms and heat. Death stalking every wave. Four lives hanging upon a single, invisible thread—a radio beam, guiding them to security through endless surging Pacific wastes.

For such a task—for the positive assurance that in spite of the elements, this equipment would not fail through faulty insulation—it is no wonder that Celoron Insulation was used in all three of the giant Fokker's transmitting and receiving sets.

It is only natural that Celoron Silent Gears—strong, wear-resisting and dependable—should have been selected to turn the generators supplying the endless flow of vital energy to the radio equipment and to the plane's lighting system.

THE CELORON COMPANY
BRIDGEPORT -- PENNSYLVANIA
In Canada: 350 Eastern Avenue, Toronto

Celoron Products Include:

Celoron Molding Powders; Impregnated Fabric and Paper for Molding; Synthetic Resins, Varnishes and Cements; Laminated Celoron sheets, rods and tubes for radio, electrical and industrial purposes; Celoron Silent Gears.

CELORON

Announcing FUEL FEEDS *of the* Immediate Future

STEWART-WARNER presents ten new or improved Fuel Feed Systems and devices produced out of 15 years of fuel feed experience. These fully meet today's engine requirements and today's traffic needs and obtain better performance and higher efficiencies on today's and tomorrow's fuel.

This is our most important announcement since the original Stewart-Warner Vacuum Tank. The Vacuum Tank, improved in design and operation, continues to be the best fuel feed device for many motors. The other products here announced range beside it and find their application on the other motors of today.

No redesign of engine or chassis is required in applying these products excepting the Direct System.

Providing a Sales Accelerator

National consumer advertising will follow this announcement, interpreting these important automotive advances. The great operating advantages secured with these improvements and the valuable publicity that will attach to them constitute a set-up of real value to car builders who take the initiative. Our engineers are at your service in working out your fuel feed problem and demonstrating these devices and systems on your cars.

STEWART-WARNER SPEEDOMETER CORPORATION, CHICAGO, U.S.A.

STEWART-WARNER

Stewart-Warner World Wide Distribution and Service

General Description

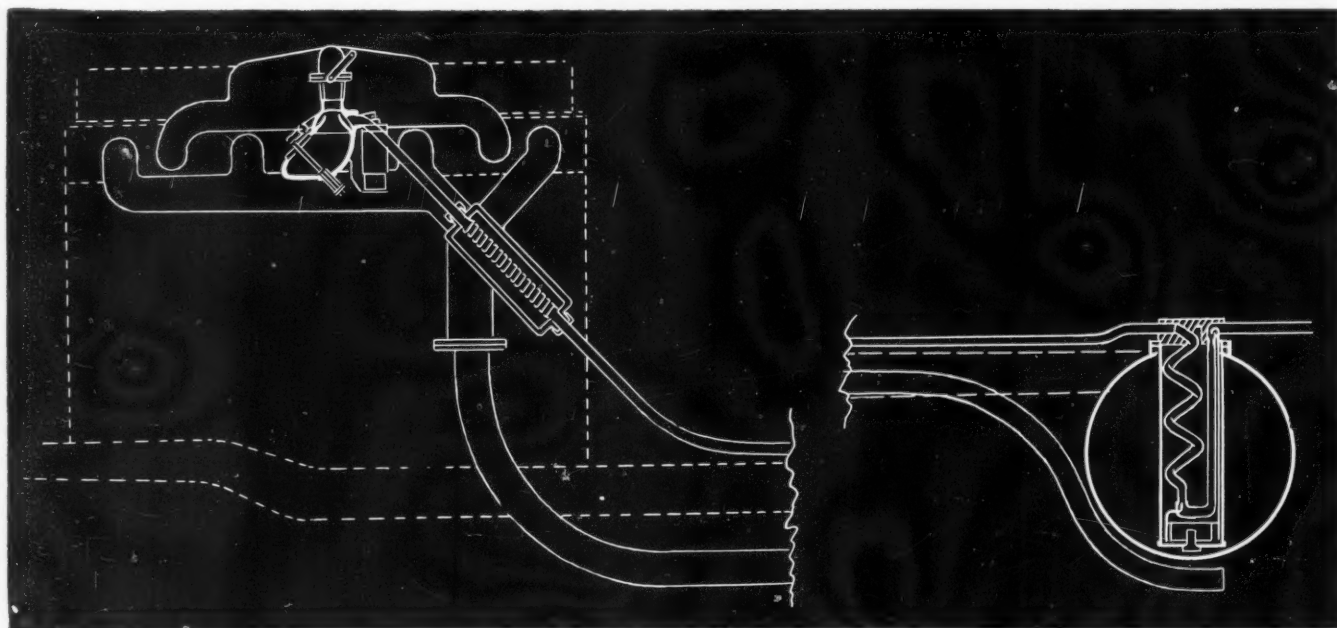
The Direct Fuel Feed System

THIS is the industry's first radically different fuel feed system.

It eliminates the vacuum tank and carburetor both in function and in fact. It provides complete vaporization and proper fuel ratios with all fuels under every condition. Carbon, crank case dilution, and "knocking" are practically eliminated. Insures smooth performance, quicker starting and rapid acceleration, brings fuel economies, reduces installation costs.

and practically eliminates the need for servicing.

Ten unremitting years of testing on all types of engines under all conditions preceded this announcement. Improvements in results over former methods were universal. This system is sound in conception, simple and practical in design, and positive in operation. A brief description of its parts and functions is here given; our engineers offer complete details and demonstrations.



Essentially the Stewart-Warner Direct Fuel Feed System consists of three operating phases:

[A] A chamber, placed in gasoline tank. Constant gasoline level is maintained in chamber by simple cork float operated poppet valve. A pipe coil containing two gasoline jets is placed in this chamber. One end of coil attaches to pipe line passing along the muffler, bringing in warmed fresh air. Other end attaches to $\frac{3}{4}$ -inch intake tube through which gasoline is drawn by cylinder vacuum toward engine. Heated intake air and turbulence caused by pipe coil partially vaporize entrained gasoline.

[B] A section of intake line spun with a spiral groove and surrounded by a chamber into which hot exhaust gases are introduced. A few engine explosions heat this section to efficiency point. Free gasoline vapor passes through this section, heavier ends are retained in spiral and vaporized.

[C] An air mixing valve automatically controlled by cylinder vacuum and balanced by an air bleed plunger type dash pot. Gasoline vapor is here mixed with fresh air in ideal ratios as later explained. High volumetric efficiency is gained by giving intake manifold a cooled, dry gas. In starting and acceleration, dash pot slightly retards action of air valve, supplying richer mixture to intake manifold, giving the effect of

an accelerating pump. Such air valve restriction increases air velocity in pipe line in proportion to throttle opening at start of acceleration period, thus providing desirable variation in mixture for varying speeds, the ratio of richness being inversely proportional to starting engine speed, amounting in effect to a graduated accelerating well. When engine is shut off, incondensable gases remain in the system, further facilitating starting.

Mixture in pipe line is at all times incombustible due to its richness. Line itself prevents flame propagation. Back-firing only forces smoke into tube, killing the flame. Designed for airplane use, this is believed to be the most nearly fire safe fuel feed system so far devised.

General Description

The Electric Fuel Feed System

A SELF-CONTAINED fuel feed system incorporating an improved carburetor, an electric fuel pump, a pump regulator and a Gascolator in one unit.

It eliminates the vacuum tank. Is operable when the ignition switch is on. Is compact and simple in design and efficient in operation. Supplies all the fuel the engine requires under all conditions and in proper ratios. Brings fuel economies, smoother performance, quicker starting, greater response, higher speeds, reduced installation costs, and is applicable without any engine changes.

It has been tested for several years under all conditions with all types of engines, in addition to laboratory tests approximating many years engine use. Brief description herewith, complete details and demonstrations may be arranged.

Major details of the Stewart-Warner Electric Fuel Feed System are: [A], the carburetor. Its air intake passage provides symmetrical air flow through the venturi, distributing fuel evenly to the intake manifold. This together with its extreme freedom ordinarily gives a 10-15 per cent increase in engine output. Instead of conventional jet, a streamlined bridge is used in the throat. Liquid fuel spreads over its top edge, coming off in a plume and providing better atomization and thorough diffusion in the air stream.

No float mechanism is used. Instead the head of gasoline in the fuel chamber or riser actuates a diaphragm which electrically controls the pump and keeps the fuel at a level within plus or minus one m.m. for all demands up to 17-17½ gal. per hour. This constitutes the Pump Regulator.

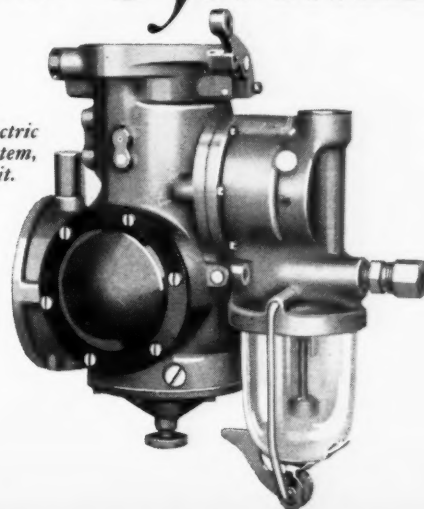
Two accelerating diaphragm pumps are used in connection with large free check valves connected with the riser chamber. Chambers have fixed orifices leading to the bridge in the carburetor throat. Manifold pressure changes operate one diaphragm through a passage

leading above the throttle. The other is actuated by a cam on the throttle spindle, coming into action when throttle opens 15-20 deg. Together they provide required additional fuel for all accelerations.

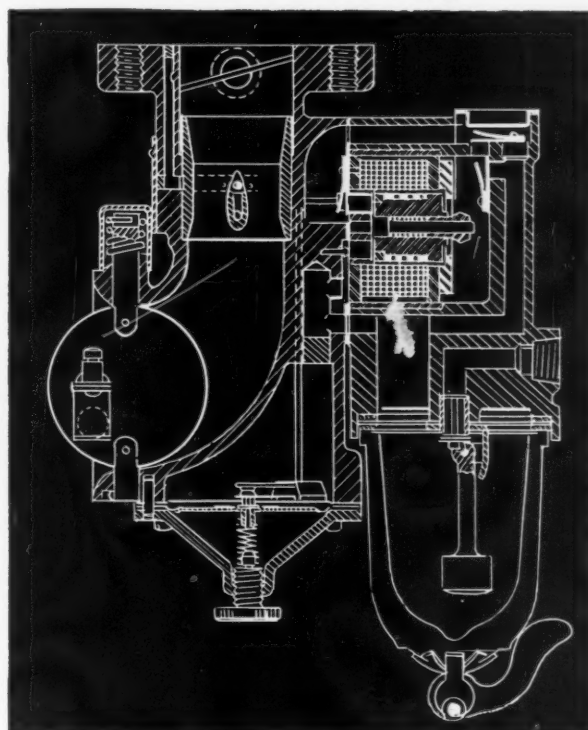
The pressure-operated diaphragm also operates the economizer through a small valve. Over-all manual enrichment for warming-up also provided.

[B] An electro-magnetically operated plunger type pump with capacity of 17-17½ gal. per hour. Magnet iron plunger is fitted with bakelite rings forming self-adjusting seal.

Closure of the pump circuit at the Regulator energizes pump winding and draws plunger in against spring pressure. Pump circuit breaks at end of in-stroke, plunger returns through spring pressure, and circuit is again closed at end of out-stroke, the cycle being repeated as demanded by change of head



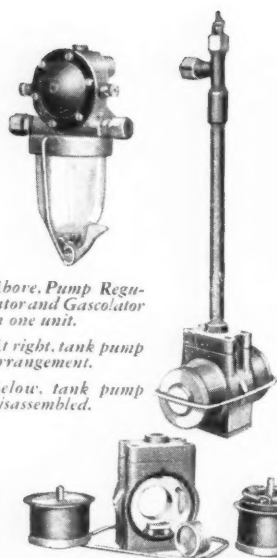
Complete Electric Fuel Feed System, in one unit.



of fuel upon Regulator diaphragm.

Pump is double-acting with light spring seated flapper valves. In Gascolator below pump is hung a weight which closes poppet valve which admits fuel to Gascolator against brake application, parking down hill, etc., preventing stalling of engine through gasoline surging into carburetor.

Electric circuit contact points are in fuel compartment. The gasoline scrubs them clean, keeps them cool, prevents oxidation, and extends their useful life far beyond average car life.



Above, Pump Regulator and Gascolator in one unit.

At right, tank pump arrangement.

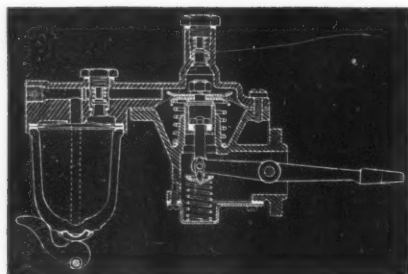
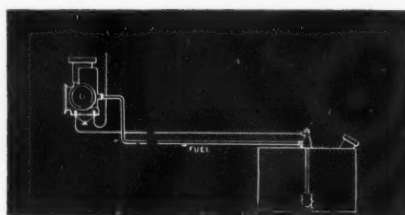
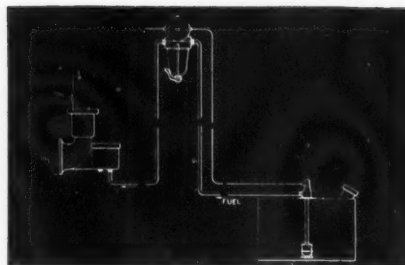
Below, tank pump disassembled.

Three Modifications of the Electric System —One Using Any Carburetor

One modification [upper right diagram] consists of Stewart-Warner Gascolator and Pump Regulator in one unit, with the Stewart-Warner Pump adapted for installation in the gasoline tank.

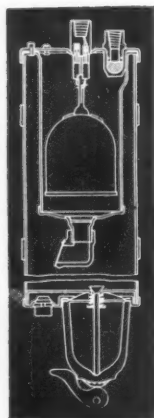
This system may be used with any carburetor.

Another modification [lower right diagram] consists of the Stewart-Warner Carburetor and Pump Regulator in connection only with the Stewart-Warner Pump placed in the gasoline tank, and eliminating the Gascolator. A third modification is this improved carburetor with vacuum tank or fuel pump.



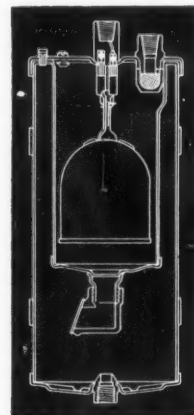
Stewart-Warner Mechanically Operated Fuel Pump

Driven from the cam shaft by an eccentric. Variable diaphragm stroke is obtained by a plunger pick-up pulling on the diaphragm in proportion to the back pressure from the carburetor float chamber. Leather cushion absorbs shock and stills noise. [Cross-section at left.]



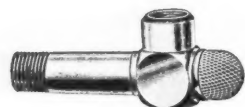
Cam Shaft Driven Vacuum Pump System

A cam shaft driven vacuum pump, used with extremely small vacuum tank, maintaining desirable vacuum for satisfactory operation. Has no effect when manifold vacuum exceeds that point, being closed by check valve between pump and manifold vacuum outlet connections. [Cross-section, right, below.]



Quick Dumping Stewart-Warner Vacuum Tanks

Dump twice as rapidly as former models through increased venting, taking advantage of all high vacuum periods and greatly increasing their efficiency. All springs are eliminated, flapper valve is improved and simplified, operation is by weighted float. Furnished with Gascolator [left] and without [right]. When Gascolator bowl is removed for cleaning, spring operated valve shuts off fuel. Also, there is our standard line of vacuum tanks improved where possible.

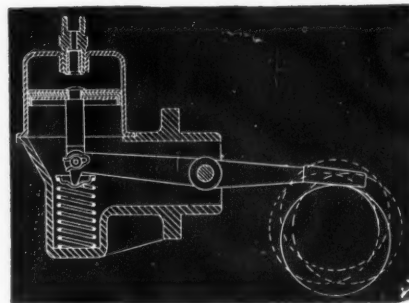


Stewart-Warner Vacuum Booster

Properly listed here though in use several months. For engines with low inlet manifold vacuums, etc. An injector admitting additional air to manifold, increasing vacuum at tank by approximately 400 per cent at full throttle. [Illustrated at left.]

Trap Valve

Mounted in cylinder head and communicates with explosion chamber. Improves vacuum tank operation by utilizing intermittent "high spot" vacuum found particularly in motors timed for late intake.



STEWART-WARNER

STEWART-WARNER SPEEDOMETER CORPORATION, CHICAGO, U. S. A.

No. 1 High Test Welding Rod

Oxweld's answer to the
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HIGHER pressures and greater stresses require steel welds of greater strength. To answer this new demand, Oxweld made the No. 1 High Test Welding Rod.

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Moreover, welders can work faster with Oxweld H. T. Rod. This reduces welding costs.

Wherever the strength of welds is an important factor, it will pay you to use Oxweld High Test Welding Rod.

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- about 5 million gallons of liquid paint and varnish and some 2 billion hardware units

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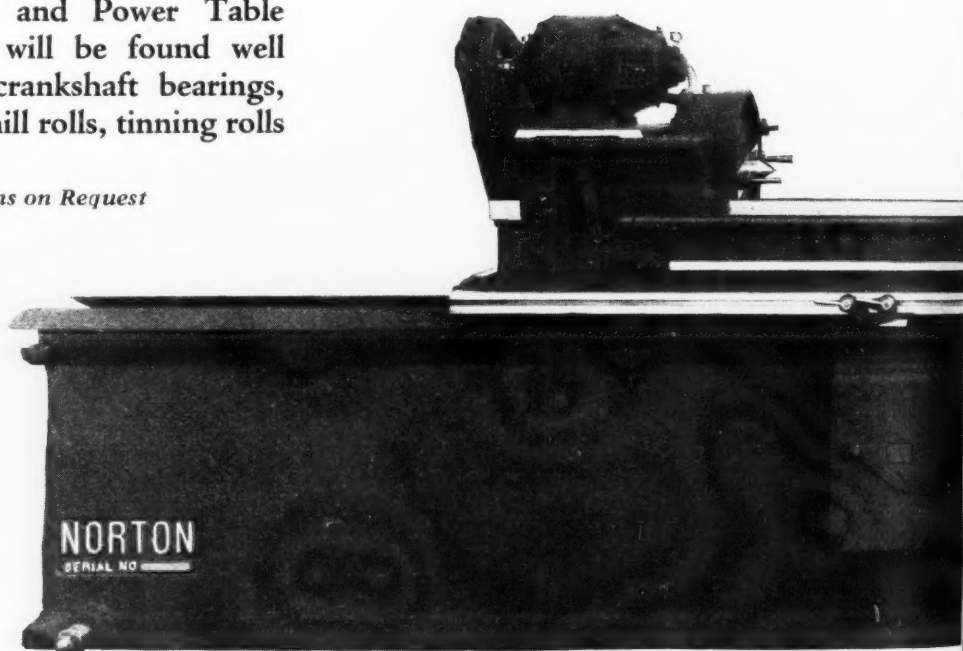
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THE original Norton Design of Spindle Bearings and Grinding Wheel Drive Unit known as "Type B" has contributed in a large measure to the remarkable success of the 10" Type BA machines.

All of the valuable features of this drive are now incorporated in a New and Heavier Machine—the 14" Type BA.

Arranged for Motor Drive and Power Table Traverse the new machine will be found well adapted for such work as crankshaft bearings, car axles, shafts, small steel mill rolls, tinning rolls and the like.

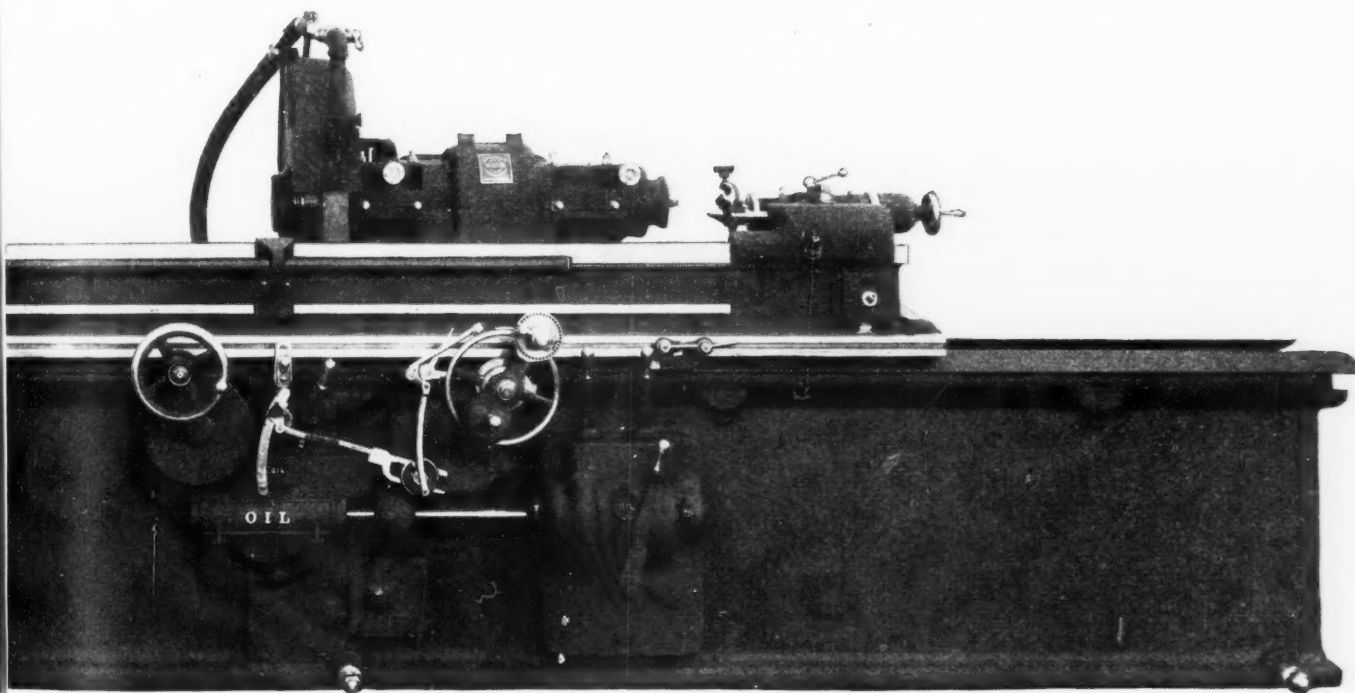
Catalog and Specifications on Request



NORTON COMPANY, WORCESTER, MASS.
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A 14", TYPE BA GRINDING MACHINE

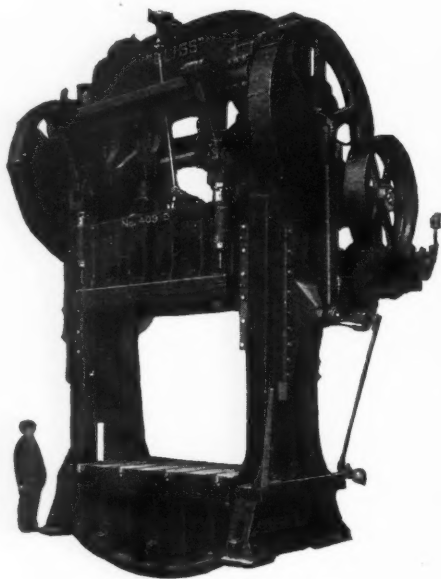


14" x 96", Type BA, Norton Grinding Machine,
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With the elimination of three studs,

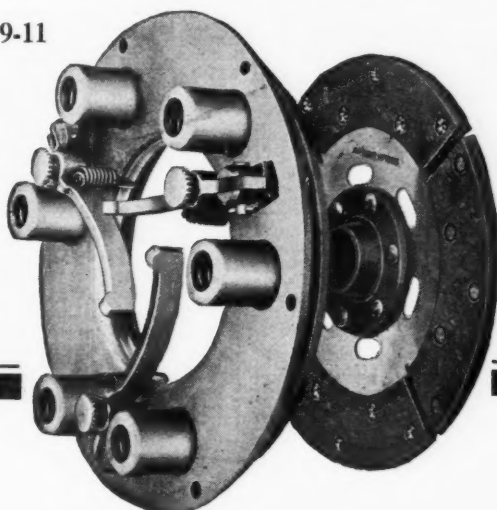
greatly simplifying construction the new and improved Rockford takes care of increased torque—and is *manufactured at a positive saving to you . . .* Requires lighter pedal pressure—is smoother, more positive in action and provides SPEED WITHOUT STRAIN.

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Rockford Industrial Clutch

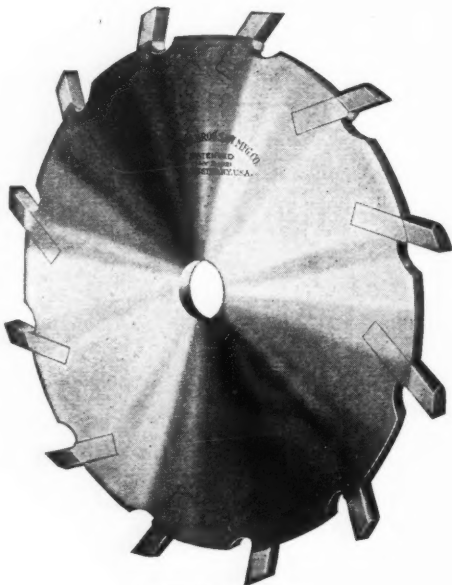
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	<p>Enters more than 2000 plants making automotive parts for original equipment and replacement, accessories, bodies, tractors, motor cycles and aircraft besides those making buses, trucks and passenger cars. What a market for production machinery and plant equipment!</p> <p><i>from a Motor Car Company—</i></p> <p>"I can very definitely say that <i>Automotive Industries</i> is very often used as a reference by all of the major executives in our office, from the president down. <i>Automotive Industries</i> has always been regarded as a very vital part of our library."</p>	
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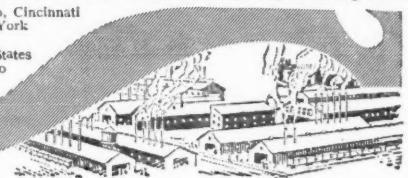
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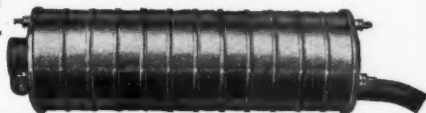
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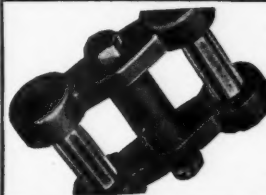
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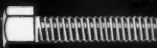
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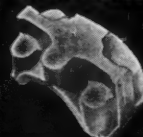
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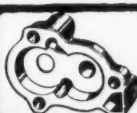


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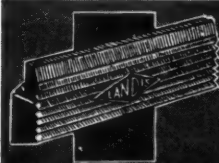
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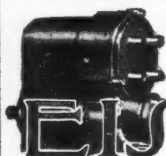
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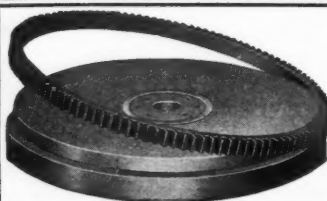
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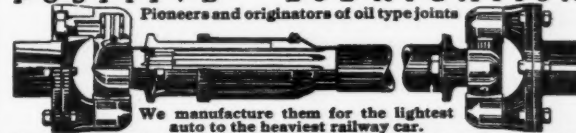
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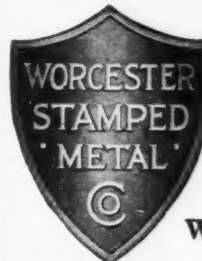
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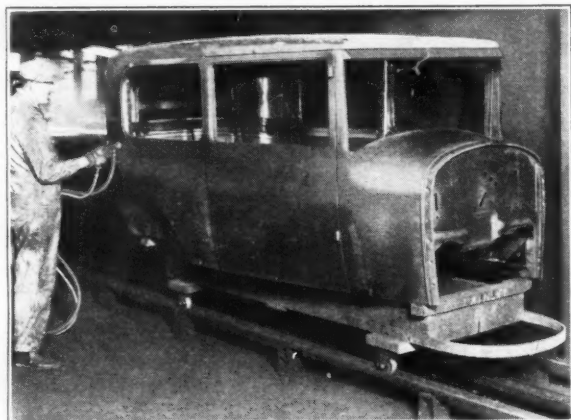
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Vanadium Corp. of America</p> <p>Ammeters
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Wisconsin Parts Co.</p> <p>Babbitt Metal
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Bullard Mach. Tool Co.</p> <p>Brake Assemblies
Bendix Brake Co.</p> <p>Brake Bands
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Toledo Alloyed Castings Co.
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Handy Governor Corp.</p> <p>Finishes
Armitage Co., John L.</p> <p>Floor Boards, Wood
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Canton Forge & Axle Co.
Champion Machine & Forging Co.
Endicott Forging & Mfg. Co.
Ferracute Machine Co.
Gears & Forgings, Inc.
Park Drop Forge Co.
Wyman-Gordon Co.</p> <p>Fuel Lines
Tite-Flex Metal Hose Co.</p> <p>Furnaces, Annealing & Carburizing
Electric Furnace Co.
Hagan Co., George J.</p> <p>Furnaces, Electric
Electric Furnace Co.
Hagan Co., George J.</p> <p>Furnaces, Forging & Welding
Electric Furnace Co.</p> <p>Furnaces, Heat Treating & Rotary
Electric Furnace Co.
Hagan Co., George J.</p> <p>Gaskets, Felt
American Felt Co.
Western Felt Works</p> <p>Gaskets, Radiator
McCord Radiator Mfg. Co.</p> <p>Gauges
Federal Products Co.</p> <p>Gauges, Tire
Schrader's Sons, Inc., A.</p> <p>Gear Cutting Machines
Brown & Sharpe Mfg. Co.</p> <p>Gear Material
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Celoron Co.</p> <p>Gear Testing Machines
Fellows Gear Shaper Co.</p> <p>Gears, Metallic
Canton Forge & Axle Co.
Gears & Forgings, Inc.
McGill Metal Co.
Park Drop Forge Co.</p> <p>Gears, Non-Metallic
Celoron Co.
Delaware Hard Fibre Co.
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General Electric Co.
Waukesha Motor Co.</p> | <p>Gears, Steel Ring
Accurate Gear Co.</p> <p>Gears, Steering
Ross Gear & Tool Co.</p> <p>Governors
Handy Governor Corp.</p> <p>Grinders, Cylinder
Hall Mfg. Co.</p> <p>Grinders, Tool
LeBlond Mach. Tool Co., R. K.</p> <p>Grinding Machines
Black & Decker Mfg. Co.
Brown & Sharpe Mfg. Co.
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Foot-Burt Co.
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Norton Company</p> <p><i>Cylindrical</i>
Cincinnati Milling Machine Co.
Foot-Burt Co.
Heald Machine Co.
Norton Co.</p> <p><i>Internal</i>
Heald Machine Co.</p> <p><i>Surface</i>
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Heald Machine Co.
Norton Co.</p> <p><i>Tool</i>
Cincinnati Milling Machine Co.</p> <p><i>Universal</i>
Norton Co.</p> <p><i>Valve Seat</i>
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Fitchburg Grinding Machine Co.
Foot-Burt Co.</p> <p>Grinding Wheels
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National Machinery Co.</p> <p>Handles, Door
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Mitchell Specialty Co.
Ternstedt Mfg. Co.</p> <p>Heaters
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Eberhard Mfg. Co.</p> <p>Hobs
Brown & Sharpe Mfg. Co.</p> <p>Hoists, Portable
Canton Foundry & Machine Co.</p> <p>Hones, Cylinder
Hall Mfg. Co.</p> <p>Horns
Stewart-Warner Speedometer Co.</p> |
|---|--|--|--|--|

Hose Clamps Konigslow Mfg. Co., Otto	Plain Cincinnati Milling Ma- chine Co.	Removers, Enamel and Paint American Chemical Paint Co.	Speedometers Stewart-Warner Speed- ometer Corp.	Taps Greenfield Tap & Die Corp.
Hose, Radiator Tite-Flex Metal Hose Co.	Universal Cincinnati Milling Ma- chine Co. LeBlond Machine Tool Co., R. K.	Retainers Bearings Co. of America	Speed Reducers Gears & Forgings, Inc.	Taps, Collapsible Landis Machine Co.
Housing, Axle Bossert Corp.	Mirrors, Rear Vision Stewart-Warner Speed- ometer Corp.	Rim Sections Bethlehem Steel Co.	Springs Flat American Steel & Wire Co. Hubbard Spring Co., M. D.	Thread Generators & Cutters Fellows Gear Shaper Co.
Hydraulic Machines Chambersburg Engi- neering Co. Chambersburg-National Co. Lapointe Co., J. N. National Machinery Co.	Motors, Electric Allis-Chalmers Mfg. Co. General Electric Co.	Riveting Machines Taylor-Winfield Corp.	Leaf Eaton Axle & Spring Co. Mather Spring Co.	Threading Machines Landis Machine Co.
Indicators, Dial Federal Products Co.	Moulded Parts Bakelite Corp.	Rivets The Atlas Bolt & Screw Co. Russell, Burdall & Ward Bolt & Nut Co.	Spiral American Steel & Wire Co. Hubbard Spring Co., M. D.	Tools, Small Brown & Sharpe Mfg. Co.
Insulation Bakelite Corp.	Mufflers Powell Muffler Co.	Rods International Nickel Co.	Spring Shackles, Ball Bearing Fairair Bearing Co.	Transformers, Electric Allis-Chalmers Mfg. Co.
Keys, Standard Woodruff Moltrup Steel Prod. Co.	Nickel International Nickel Co.	Rolling Mills Bliss Co., E. W.	Stampings Acklin Stamping Co. American Sheet & Tin Plate Co. Bossert Corp. Bowen Prods. Corp. Hubbard Spring Co., M. D. Indiana Pressed Steel Co. Konigslow Mfg. Co., Otto Mitchell Specialty Co. Motor Wheel Corp.	Transmissions Fuller & Sons Mfg. Co.
Lacquer Armitage Co., John L.	Nuts, Square & Hex The Atlas Bolt & Screw Co.	Running Boards, Wood Mengel Co.	Steel Alloy Bethlehem Steel Co. Central Alloy Steel Corp. Illinois Steel Co. Timken Roller Bearing Co.	Trucks Baker-Raulang Co.
Lamps General Electric Co.	Oils Sun Oil Co.	Rust Removers and Pre- venters American Chemical Paint Co.	Bars Federal-Mogul Corp. Illinois Steel Co. Timken Roller Bearing Co.	Tubes, Axle & Steering Column Pittsburgh Steel Prod- ucts Co.
Lapping Machines Norton Co.	Packing, Metallic & Plas- tic Metallic Conneaut Packing Co.	Saws Huther Bros. Saw Mfg. Co.	Billets Illinois Steel Co. Timken Roller Bearing Co.	Tubes, Seamless & Torque Pittsburgh Steel Prod- ucts Co.
Lathes Bullard Machine Tool Co. Seneca Falls Machine Co.	Pads, Felt American Felt Co. Western Felt Works	Screw Machine Products Delaware Hard Fibre Co. (fibre) Ferry Cap & Set Screw Co. National Acme Co. Shimer, Samuel J. & Sons	Carbon Illinois Steel Co. Timken Roller Bearing Co.	Tubing, Brass & Copper Dallas Brass & Copper Co.
Automatic LeBlond Mach. Tool Co., R. K. Seneca Falls Mach. Co.	Paints Armitage & Co., John	Screw Machines Brown & Sharpe Mfg. Co. Cleveland Automatic Machine Co. National Acme Co.	Cold Drawn Moltrup Steel Prod. Co.	Tubing, Flexible & Metal Tite-Flex Metal Hose Co.
Automatic Chucking Bullard Mach. Tool Co.	Paints, Manifold American Chemical Paint Co.	Screws, Cap The Atlas Bolt & Screw Co. Ferry Cap & Set Screw Co.	Heat Drawn American Sheet & Tin Plate Co.	Tubing, Seamless Wolverine Tube Co.
Automatic Single Spindle Jones & Lamson Ma- chine Co.	Parts, Special Celoron Co.	Screws, Clamp Eberhard Mfg. Co.	Electric Furnace Central Alloy Steel Co. Timken Roller Bearing Co.	Turbines, Steam & Hy- draulic Allis-Chalmers Mfg. Co.
Axle Turning Seneca Falls Mach. Co.	Parts, Wood Body Mengel Co.	Screws, Lag Buffalo Bolt Co.	Long Terne American Sheet & Tin Plate Co.	Turntables, Industrial & Automobile Canton Foundry & Ma- chine Co.
Crankshaft Turning LeBlond Mach. Tool Co., R. K. Seneca Falls Mach. Co.	Pickling Compounds American Chemical Paint Co.	Screws, Machine American Screw Co. The Atlas Bolt & Screw Co.	Shapes Illinois Steel Co.	Universal Joints Cleveland Steel Prod- ucts Corp. Mechanics Machine Co.
Engine Pratt & Whitney Co. Seneca Falls Mach. Co.	Pipe & Nipple Threading Machines Landis Machine Co.	Screws, Set The Atlas Bolt & Screw Co. Shimer, Samuel J. & Sons	Sheets American Sheet & Tin Plate Co. Central Alloy Steel Corp. Seneca Iron & Steel Co.	Valve Seaters Hall Mfg. Co.
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Vertical Turret Bullard Mach. Tool Co.	Pipes, Exhaust Powell Muffler Co.	Shafting Moltrup Steel Prod. Co. New Departure Mfg. Co.	Strip American Steel & Wire Co. Central Alloy Steel Corp.	Visors, Windshield Carter Carburetor Co.
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Lubricants Sun Oil Co.	Plates, Core & Pattern Moltrup Steel Prod. Co.	Shears Bliss Co., E. W. Ferracute Machine Co.	Welders, Electric Federal Machine & Welder Co. General Electric Co. Taylor-Winfield Corp.	Watches, Motor Car Jaeger Watch Co., Inc.
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Machines, Bending & Straightening Chambersburg Engi- neering Co. Chambersburg-National Co. National Machinery Co.	Pumps, Lubricating Cleveland Steel Prod- ucts Corp. Tuthill Pump Co.		Tank Support Straps Konigslow Mfg. Co., Otto	
Magnetos Eisemann Magneto Corp.	Punches Ferracute Machine Co.			
Milling Machines Brown & Sharpe Mfg. Co. Cincinnati Milling Ma- chine Co. LeBlond Mach. Tool Co., R. K. Rockford Drilling Ma- chine Co.	Radiators McCord Radiator Mfg. Co.			
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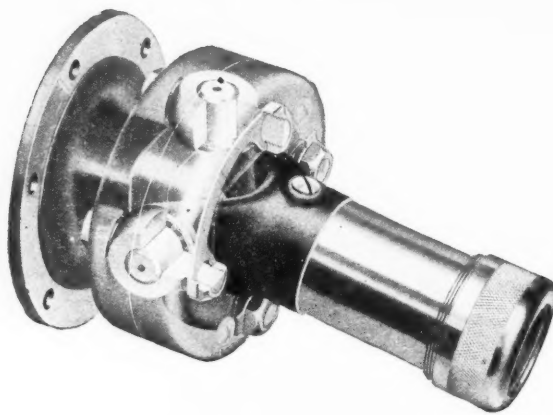


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